SKYWAYS

MILITARY ★ CIVIL ★ COMMERCIAL AVIATION

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Pilots, Polish Up Those Landings!

page 30

F's F-89
Weather
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page 14

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CHICAGO UNDERGRADUATE
DIVISION
NAVY PIER
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The Birdmen's Perch

If you wonder why we're always harping on *safety*, take a gander at some conclusions drawn from a recent CAB analysis of 850 air accidents in 1948:

In private planes, 9 out of 10 fatal crashes are due to pilot error. Nearly half of these mistakes result from recklessness.

The study, concerned with the "human equation" in flying mishaps involving planes other than commercial air carriers, blamed pilots for 758 of the fatal crashes in which 1268 persons were killed.

They found that 3 out of 4 crashes resulted from one of three types of errors: reckless flying; loss of adequate flying speed; and flying into weather which blanked out the ground.

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And Speaking of Being Careful...

A power of otherwise peerless pilots figure there's no real difference in aviation motor oils.

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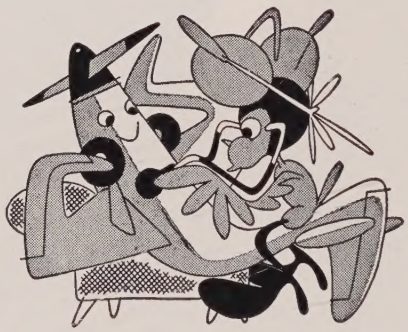


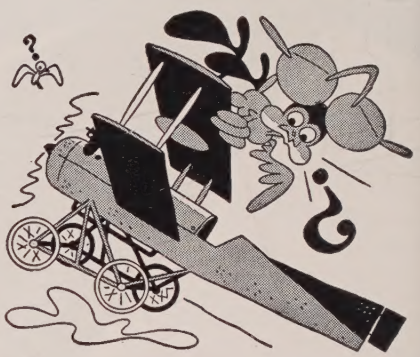
Try it and increase those periods between overhauls up to 100%.

Little Known Facts Dept.

Stand back, please, he needs air! We mean Russell Schmude of Oshkosh, Wis., who hit the jackpot with this astounding Little Known Fact About Well Known Planes, submitted with overwhelming proof!

"The Bug," a pilotless plane which was the forerunner of the German V-1, was developed by the U.S. in 1917—but never used, although it flew successfully on four test flights.

OUCH! Well, anyway, felicitations, Russ, my boy! Your Commission of Perch Pilot (bottom rung, naturally) is on the way.



Take heed, Chappies, or you'll be saluting him soon. Lest that happen, why not shoot for your own Commissions!

Don't remain unsung forever! Send your Little Known Facts About Well Known Planes—With PROOF—to this address:

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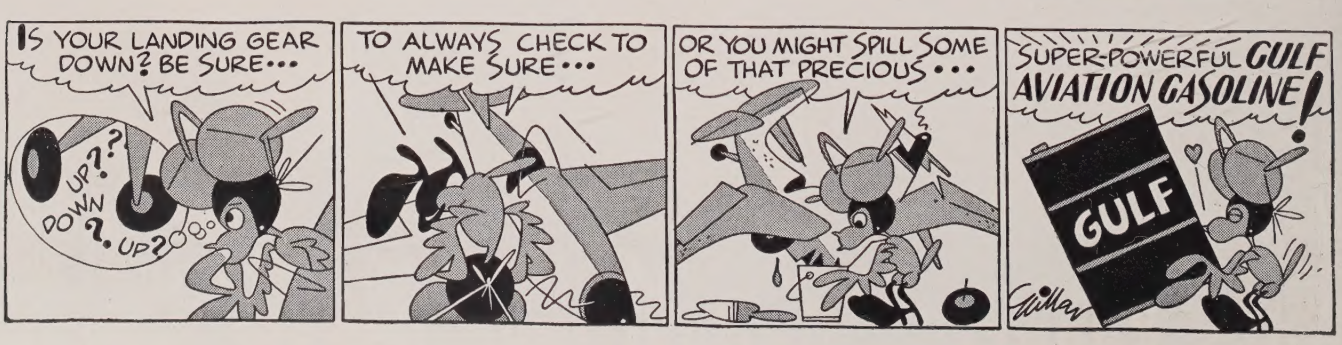
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UP?? DOWN ?. UP?
TO ALWAYS CHECK TO MAKE SURE...
OR YOU MIGHT SPILL SOME OF THAT PRECIOUS...
SUPER-POWERFUL GULF AVIATION GASOLINE!
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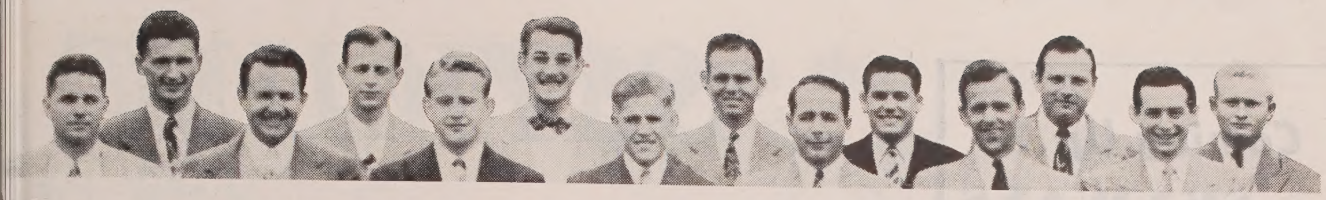

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The many hundreds of *Northrop* graduates show the way to a satisfying, profitable career for YOU. They were alert to the big future in *Aviation.* They gained for themselves the many special advantages of *Northrop* training. They are convincing proof of the rich rewards won by shrewd choice of a career field and the training for it. YOU can follow their example.

Graduate Employment Report
Compiled by Graduate Placement Department
Northrop
Aeronautical Institute

YOU CAN SEE THE RECORD OF NORTHROP GRADUATES "in black and white"

The current "Graduate Employment Report," compiled by the *Graduate Placement Department* of Northrop Aeronautical Institute, lists hundreds of Aeronautical Engineering graduates and the employers with which they were placed over an 18 months period. Here is a printed record of the constant demand for *Northrop*-trained men throughout all *Aviation.*

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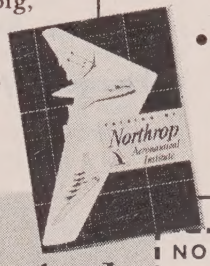
The *"Employment Report,"* described above, and the big, heavily illustrated *Northrop* catalog will give you abundant details for consideration of *Aeronautical Engineering* as a career field. Here is full information on opportunities, types of duties, qualifications, and training.



SEND COUPON FOR REPORT AND CATALOG

Read these typical reports of graduates now profiting from their Northrop training*

- *Paul B.:* "I am employed in Rocket Motor Design."
- *K. A. S.:* "I went to work the first Monday after graduation as an Experimental Technician in fuel cells."
- *Edward W.:* "I was hired immediately upon graduation. During the two years I have had several raises and a promotion. I am now working directly with the Project Engineer, in the new airplane Project Group."
- *Frank M.:* "Gene M. and I have been here at the Proving Ground for three weeks now. We have seen missiles and the V-2 rocket fired." (These two men were assigned to guided missile research as their first positions after graduation from Northrop.)
- *Douglas E.:* "I am in the Stress Group. My first job was to design the loading jigs for applying the torque loads in the (name of aircraft) static test."
- *Melvin H.:* "N.A.I. has an accurate idea of what is required of the new engineer. The practical end of our training has shown itself in a number of ways. Those of us with our technical school background have a definite edge in our work."
- *Allen B.:* "A wire offering immediate employment arrived a week after the interview. I am in Engineering Design."
- *Robert B.:* "I wanted to let you know how much I appreciate your help in securing this position. I work in the Missile Flight Test and Analysis Department."

*Names abbreviated here out of respect for personal privacy. Record on file in N.A.I. Graduate Placement Department.

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Check one: ☐ VETERAN ☐ NON-VETERAN

Coming Up... in SKYWAYS

Big news around these parts is our new NAVICOM (Air Navigation and Communication) section. Every day the use of radio is becoming increasingly important to the pilot and plane owner. To keep our readers informed in this air navigation and communications field, we are featuring SKYWAYS with NAVICOM each month. Pilots, whether you fly *Cubs, Bonanzas,* DC-3's or B-36's, you will want to know what is going on in aviation electronics to make your flying easier and safer. Get your copy of SKYWAYS with NAVICOM beginning with the July issue.

• **Here's the line-up for July:**

• **"Pilot's Report:** New '260' Navion," *by Don Downie.* Something new has been added to the *Navion* to make it one of the best airplanes ever to take off on a cross-country. The details of this new higher-powered *Navion,* plus a report on a GCA let-down in the ship, come to you in this accurate and information-packed report on how the new 1950 *Navion* compares with the '49 model.

• **"Fighters of the Air Force,"** The annual Air Force "album" of fighting planes comes to you in July this year. This Special Section brings you photographs of the high-speed jet ships of the USAF, plus performance detail and technical specifications.

• **"The Acrojets,"** *by Al Leach.* The Acrojets are the USAF's answer to the Navy's famed "Blue Angels." A team of precision aerobatic pilots performing unbelievable maneuvers in their jet F-80's, the Acrojets tell the "how's" and "When's" of high-speed jet-team acrobatics.

• **"Are You Ready?"** *by L. M. Horton.* If you're a student pilot on the verge of taking that ride for your private license, this article will tell you what your CAA man is going to look for to decide whether that ticket is yours or not. Authored by a former flight instructor and based on reports from the men who give the license flight tests, this piece is a "must" for those applicants whose flight tests are coming up.

Read SKYWAYS with NAVICOM

July Issue

On sale at all newsstands June 9

SKYWAYS

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It's akin to the Piper J-3 but it has a performance all its own

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J. FRED HENRY . . . . . Editor and Publisher
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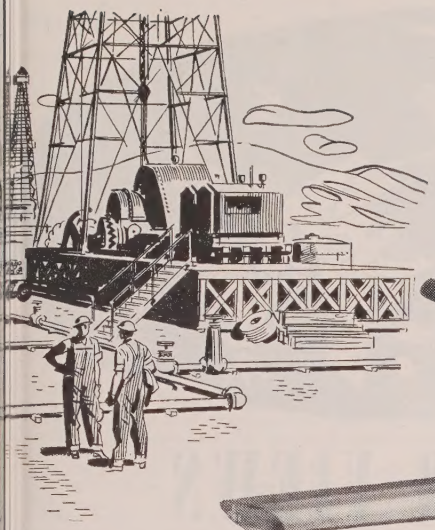
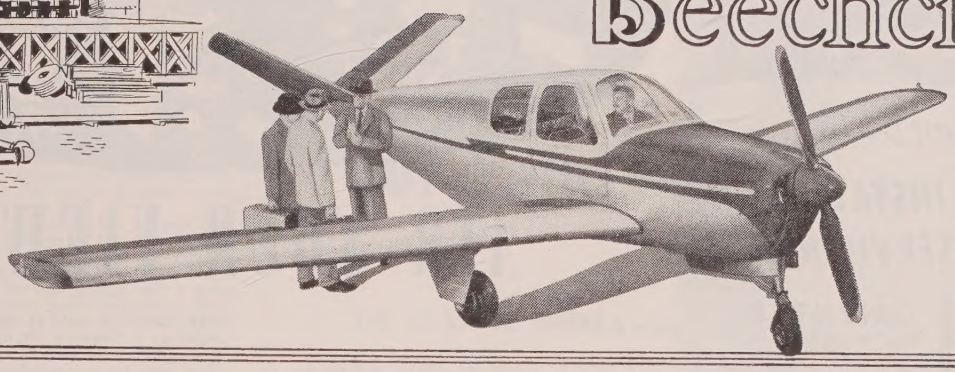
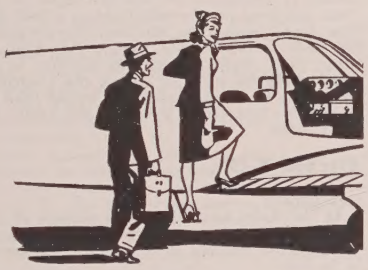
The following publications are combined with SKYWAYS: Air News and Flying Sportsman. All rights to these names are reserved by J. Fred Henry Publications, Inc.

Businesses that grow need the go of a Beechcraft

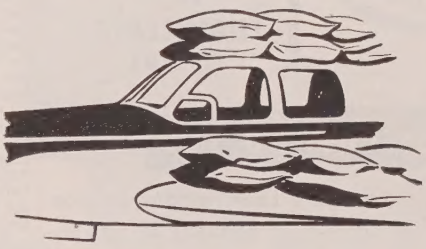




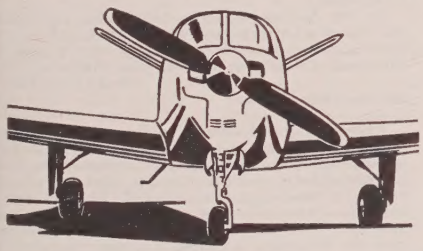


You make more calls when you cruise at a 170-mile clip. No wasted time, no wasted effort. Travel *means* more! Minutes in the air pay you back with hours of productive time.

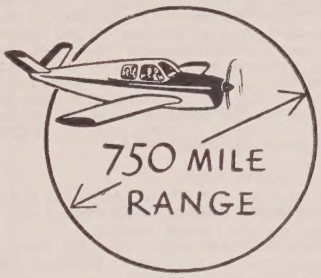
You get to *where* the business is in luxurious comfort. Room to spare for four big people in the smartly tailored, quiet Beechcraft Bonanza cabin. Maximum 5-way visibility.



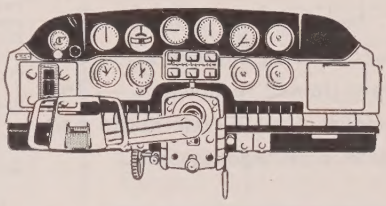
You travel in safety. The B-35 Beechcraft Bonanza is extra rugged, withstanding shock and stress tests far surpassing CAA requirements. All-metal construction.



You get top performance. Flight characteristics make it exceptionally easy to handle. Speed, range and fuel economy unexcelled! Wide, sturdy landing gear smooths out short, rough-field landings.



You get amazing efficiency. At cruising, the Beechcraft Bonanza uses only 56% of the engine's rated take-off horsepower! And fuel consumption is low—amounting to only 9.5 gallons per hour!



You enjoy many extra features. For instance, a functionally designed instrument panel, highly efficient . . . but handsome, too! Touches of luxurious comfort everywhere—even to coat hangers, ash trays, map pockets!

Get all the facts! There are hundreds more . . . about the extra advantages of the new Model B-35 Beechcraft Bonanza. Check with your nearest Beechcraft distributor or dealer, or write for complete information on your company letterhead to Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

Top speed, 184 mph
Cruising speed, 170 mph
Range, 750 miles
Fuel economy, 9.5 gph

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AIR YOUR VIEWS

More F-80

Gentlemen:

In regard to Capt. Creed's answer to Y. G. Rowland (*April, Air Your Views*) concerning the F-80, I would like to make a few corrections. Capt. Creed stated that the "F-80 has an inertia starter for 'air starts' only." This is incorrect in that the word 'inertia' is mis-used. The F-80 has an "air start" switch which, when operated, puts the ignition booster coils into operation and causes the two spark plugs to operate. This is all that is needed for the engine is already turning over due to the ram air on the compressor caused by the aircraft's forward speed. An "inertia starter" is the type used on reciprocating engines where the starter is energized. The starter motor builds up momentum and it is then engaged to the engine by the use of a solenoid engaging the starter dogs.

As Capt. Creed stated, the fuel system is rather simple as far as pilots are concerned, and he says that the only difference between the F-80 fuel system and that of the *Cub* is a "few more fuel lines, valves, etc." That "etc." part is the great part that Capt. Creed overlooked. He failed to mention the barometric, the governor, the emergency pump, the relief valve, the fuselage tank by-pass system, let alone the pressure switches, sniffle valves, pressure regulators, transfer valves, etc. His statement that the only result of not turning off the fuel switches would perhaps be a burned-out booster pump, fails to make clear that the failure of turning off the tip-tank switch causes the unnecessary waste of compressor air pressure and possible flooding of the fuel system with air under pressure. Also, I think Capt. Creed would find changing a leading edge or wing-tank booster pump not the gayest task.

CPL. WM. G. TYSON

Sheppard AF Base, Texas

Gentlemen:

If it isn't too late I'd like to add to the controversy on the F-80A between Capt. Creed and Y. G. Rowland, on the inertia starter.

During my three years with the Air Force as a maintenance man on the F-80 at Williams AFB, Arizona, I can only remember "one" starter which was used both for "ground starts" and "air starts." In both instances the starter is used to build the initial rpm before the engine is fired up.

JIM C. CHANCE

Limwood Park, Pa.

Reading letters from Capt. Creed as well as Rowland and Tyson and Chance, there's not as much difference of opinion as would seem on the surface. Matter of fact, prime cause of the controversy seems to be word and meaning interpretation. We're going to bow out here . . . and let the learned Air Force fellows carry on the "argument" between themselves.—ED.

Jet First

Gentlemen:

I wonder if you could supply me with the date, make of plane and country making the first pure jet-propelled flight. I have read reports on this flight, one saying "Italian Caproni Mark 111, in 1936." Another said "German Heinkel He-178, in 1939." Would you please try to confirm one of these reports . . . and if neither are true, supply the correct information.

W. R. EVANS-LOMBE

Morgantown, W. Va.

According to our information the first pure jet flight was made in Germany (Heinkel) in 1939. This flight lasted just seven minutes, but marked a first in a new field of propulsion. The late General "Hap" Arnold is said to have witnessed a flight of a German jet and to have returned to this country to get us going in that direction. How well he succeeded in arousing the U. S. to action is evidenced in the fact that in October, 1942, our first jet-propelled plane, a Bell Aircobra, *flew. In the meantime, however, the British Gloster had done considerable flying, the first time in May, 1940. Italy entered the picture in August, 1941, when its first jet plane, the Caproni CC-2, flew. The chronological order would then be: 1st, Germany; 2nd, Great Britian; 3rd, Italy; and 4th, USA.*—ED.

Ditched B-29

Gentlemen:

In the April issue there is a picture of a ditched B-29. I always thought that when a plane was ditched, the landing gear was up. In the picture, it is down.

R. W. TOEPFER

Sublimity, Oregon

You're right, Reader Toepfer, but in this case the photo is of a B-29 purposely placed in the water for training purposes. In short, as a "training station," that B-29 has its gear down. In the real thing, the plane is landed gear up.—ED.

Bearcat . . . or P-47

Gentlemen:

On the X-C page in the April issue you have a picture of a Grumman *Bearcat*. At our airport we have a squadron of P-47's. These two planes are identical. Could you tell me the difference?

J. PIJANOWSKI

Schenectady, N. Y.

There's a great deal of difference, J. P., and if you were to see the two ships side by side, you would realize that readily. The wings of the Bearcat *are shorter and the tips are squared, whereas the '47's wing tips are rounded. The '47 has an oval fuselage while the* Bearcat *has a more rounded fuselage. The '47's engine cowling is oval, and the* Bearcat's *is round. The tail configuration is quite different, too.*—ED.

Level Flight

Gentlemen:

I think Ben Robin's method of determining level flight from the airspeed indicator (*Nov. 1949*) is not quite as certain or easy as it sounds.

The only condition under which "when the airspeed indicator is increasing or decreasing and you apply control pressure, the pause before needle reversal is level-flight position," is true is when the time taken to correct flight position from its original to level flight is equal to the time lag of the airspeed indicator. If the flight position is corrected in less time than the instrument lag, the pause of the needle will occur after level-flight position (over-correction). If the flight position is corrected in greater time than the instrument lag, the pause will occur before level flight (under-correction).

Methinks Robin's method will not work in practice because there is no way to synchronize the instrument lag time and the flight-position correction time.

Why not spend a few dollars for a gyro horizon? Just look at it and fly level. The photo illustrating the article shows one. I think I'll let Mr. Robin figure his own level-flight position . . . . and let Mr. Sperry figure mine for me.

L. M. RICHARDS

Wayne, Pa.

We see what you mean, Mr. Richards, but Pilot Robin knows his instruments, including lag.—ED.

Mountain Flying

Gentlemen:

I read Bob Arentz article in the March issue. I'm a private pilot, 59 years old, and have some 10 years of flying. I wish to say that I've never yet read anything which was so interesting, gripping, and useful from a safe flying standpoint. It will save lives, and I for one owe you something for I've been skipping out a little myself above broken overcasts with occasionally a short hop over solid ones. But after that article . . . never again! As you presume, I haven't an IR, and don't intend to get one. It would only tempt me.

I have a few questions though:

1. What was the make of aircraft and how could it climb that high? I realize, of course, the pilot may have had strong up-drafts. I've seen a *Cub* J-3 climb to 15,000 feet under the right conditions.

2. My old instructor often told me if I were ever fool enough to get trapped over an overcast, to spin down. This experience of your friend's is the first instance of this I've ever heard of. But now that the spin isn't taught anymore, what now?

3. About how long would it take to spin . . . in that airplane . . . through 12,000 feet of overcast?

Gee, what an experience! I've done eight turns in a *Cub*, which seemed plenty, but it probably was the visual reference that made me dizzy.

G. V. CAESAR

Harbor Beach, Mich.

Harbor Beach, Mich.

Thanks for your letter, Mr. Caesar . . . and here's Pilot-Author Arentz reply: "To answer your three questions, Mr. Caesar: the plane in this case was a fabric-winged Luscombe, a prewar model. The pilot may have had help from updrafts, but I've always thought the Luscombes had exceptionally good performance in the low-power category.

"I don't agree that teaching spins for such emergencies as this is practical. Actually, it is a questionable choice for even an emergency of that kind. In this case it worked, so it was okay, but if the plane had been spinning only a few miles to the east, the spin would have ended in the ground! The reason instructors recommend a spin, of course, is to eliminate the possibility or inevitability of a power spiral if a let-down were tried by 'normal' means. Where the countryside is open and you know what's under the overcast, a spin is all right, but no better than the power-off glide technique if your aircraft is rigged properly and will trim out to the right degree. This choice has some distinct advantages. Briefly, you apply carburetor heat, get your engine set at very low power, but with enough rpm to keep it running, then trim it out nose high in a glide . . . not to a point where it is stalling . . . so that it will maintain your normal power-off gliding approach speed. Then you get the H. . . off the controls and let nature take its course. And stay off the controls even though you become absolutely positive you are upside down and inside out!

It might be safe to take a north or south heading and, while sitting on your hands, hold that heading by use of rudder alone. You are almost certain to reach a point where you think you are slow rolling, so you should be prepared to have will power enough to remove your feet from the rudder at anytime you become convinced the ship just has to have some degree of control. If you weaken and are foolish enough to take over and 'straighten' it up, you're dead, lad, that's all!

This is something you can practice CAVU for fun and it can easily save your life if the emergency arises. But, a spin is indeed better than a power spiral.

You're third question beats me. I can't even guess with you on it, except to observe that down drafts and up drafts exist in soupy weather and would effect your rate of descent. But if I have to guess: four minutes and 17 seconds!

"Happy landings, (signed) Bob Arentz" Okay, Mr. Caesar?—ED.

Cub Flying

Gentlemen:

I've got a bone to pick with some of your authors! I don't think they have ever flown a *Cub*. I'm referring to those who say, ". . . is as easy to fly as a *Cub*." My own log books shows just about 300 hours, but I've flown all but a very few light planes, and some of the heavy ones up to a DC-3. Of these, I have found the DC-3 to be the easiest to fly and the Piper J-3 the hardest. I don't have anything against Piper either, because I'm very interested in their new *Pacer*. Maybe I just don't happen to like the *Cub*. I have never been able to make what I consider a good landing in one yet. Although I really don't think you can satisfy everyone. Someone would find fault with such things as "easy to fly as a kite," or "as a paper dart," or "as a B-17." Those just wouldn't strike the right chord in a lightplane pilot's mind.

B. SCHEURER

Corvallis, Oregon

I'm the Cub *type myself.*—ED.

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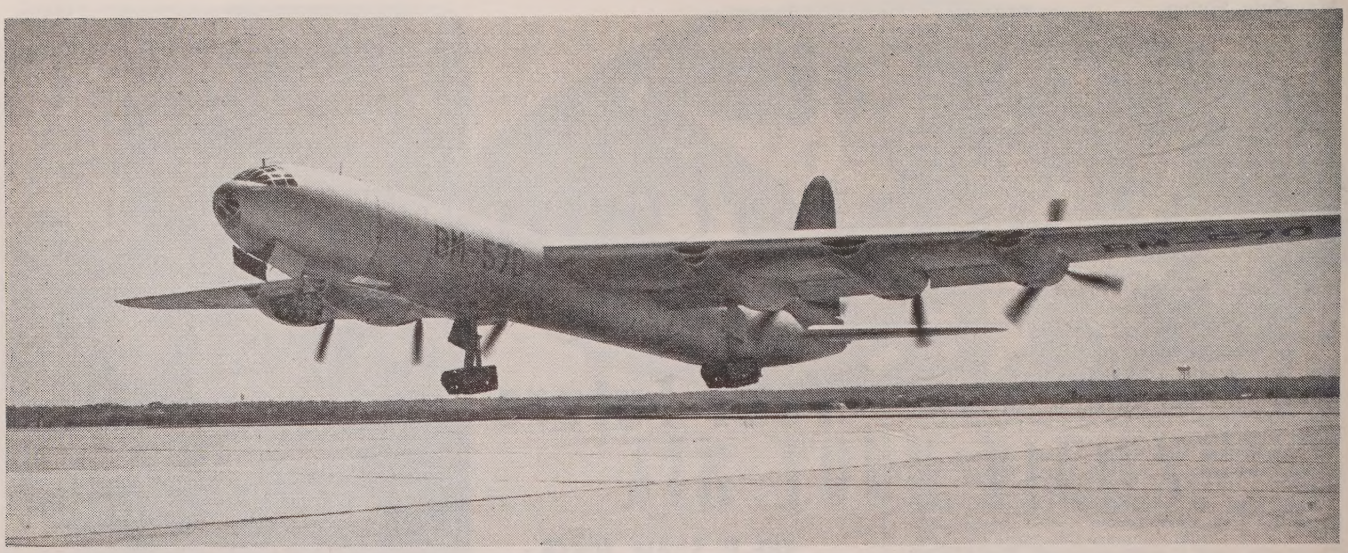

AIR FORCE XB-36 is shown here leaving the runway on the big bomber's first take-off with the new caterpillar-type track landing gear

MILITARY AVIATION

AIR FORCES' newest version of the B-36 may be swept-wing propjet with tractor installation of engines instead of pusher. If this experiment works out as expected, plans for the Boeing B-52 may be abandoned.

JET INTERCEPTOR built by North American, the YF-86D, has been re-designated the F-95A. Designed to climb rapidly for interception at high altitudes, the F-95A features a shark nose housing special radar equipment for search and all-weather flying.

TRACTOR-TYPE GEAR has been installed on the XB-36 for experimental purposes. Taxi tests and take-off and landing tests already have been made. With this caterpillar-type gear, the weight of the '36 rests on bogie wheels rolling on two endless belts on each main landing gear strut. The conventional B-36 main and nose gear weighs about 16,000 pounds; the tractor-type gear weighs an additional 5600 pounds.

BRITAIN plans to double its jet fighter strength during the coming year. In the meantime, Defense Secretary Johnson continues to talk cut-back, which means that soon the striking force of the USAF will number just 34 groups, some 36 groups less than the number the Air Force estimated would be necessary to stave off an aggressor for an 18-months mobilization period.

FIGHTER SQUADRONS equipped with jets continue to fly regular combat patrol missions in the Orient "to keep watchful eye on Red forces."

HUGHES AIRCRAFT recently unveiled its "Flying Crane" helicopter, a jet-powered 'copter under development for the Air Force. It is powered by twin GE J-35's rated at 5,000 pounds thrust, and was designed to meet Army needs for short-haul of heavy equipment such as tanks, artillery across so-called impassable terrain.

WHIRLI-BIRDS are now "on duty" at Wiesbaden, Germany. Air Rescue Service H-5H's have been assigned to 7th Rescue Squadron Flights at Wiesbaden; Dhahran Air Field, Saudi Arabia; and Wheelus Field, Libya.

RAF PILOTS flying Bristol *Brigands,* twin-engine, heavily armed fighters, have been busy lately attacking bands of Malayan bandits, the *Brigand* carries bombs and rocket projectiles under the wings. These 5,000-hp fighters (two 2,500-hp *Centaurus* engines) are based at Singapore.

EXERCISE SWARMER, which took place in April, gave the new Fairchild C-119 *Packets* their first large-scale operational work-out. The C-119 is the more powerful successor to the well-known C-82. Thirty-five C-119's took part in "Exercise Swarmer."

AIR RESCUE SERVICE 'copter has been roped but not hog-tied, reports an Information officer from Washington, D. C. On a recent mission, an H-5 flown by Lt. R. C. Kirkland of Flight C, 4th Rescue Squadron, McChord AFB, experienced loss of directional control. Lt. Kirkland made an emergency landing in about two feet of water. The tide was out at the time, making it evident that the 'copter faced complete submersion later when high tide rolled in. An RCAF Norseman which had been escorting the helicopter radioed the RCAF to dispatch a high-speed launch to the scene. When it was found that the 'copter could not be pulled to higher ground, Lt. Kirkland tied a strong rope to the H-5's tail section. Then the RCAF men who'd come in on the launch held on to the rope, giving the 'copter directional control while Lt. Kirkland slowly flew it to safer ground. The helicopter later was dismantled and returned to McChord.

MARINE CORPS fighter pilot Lt. G. C. Armstrong can thank the good people of Lawrence, Kan., for getting him out of a tight spot recently. On an X-C by *Corsair* from Glenview, Illinois to Albuquerque, New Mexico, Lt. Armstrong ran into an upper air storm over Lebo, Kansas. His *Corsair* began to pick up ice. Armstrong reversed his direction, intending to return to Kansas City to land. However, his remote indicating radio compass would not pick up Kansas City or any other station. It had gone out completely. By this time it was dark and the storm was increasing in intensity. Spotting a hole in the clouds, Lt. Armstrong dived through into a "clear" area and began to circle the lights of an unknown town. It was Lawrence, Kansas, and at this point the citizens sprang into action. A parade of cars left town and surrounded a small grass emergency strip, lighting it with their headlights through the rain. The car in the lead attracted Armstrong's attention with a spotlight and indicated the field was clear for a landing. Meanwhile, some other citizen called K.C. by phone and K.C. in turn phoned the Naval Air Station at Olathe, Kansas, and informed officials of Armstrong's plight. Olathe radio called Armstrong as he was gliding into the Lawrence field and directed him not to land. Olathe radio directed the pilot to climb up through the weather and to try to locate a commercial *Constellation* approaching K.C. on the southwest leg of the radio beam. To aid Armstrong, the pilot of the "Connie" was asked to "drop" his landing light. Armstrong spotted the bright beam in the distance, flew parallel to the plane, set his gyroscopic compass to coincide with the K.C. beam heading, then steered a course for the Olathe Air Station. Olathe radio operators guided Armstrong down through the storm, but the pilot, suffering badly from vertigo, lost his horizon and went into a steep dive. When he broke through the clouds at a low altitude, he luckily saw the Olathe rotation beacon in time to recover from the dive and to get safely into the field in a freezing rain. The first thing Marine pilot Lt. Armstrong did when he reached his home a few days later was to write a letter to the mayor of Lawrence, Kansas, thanking the townspeople for their help—a brand of help he'll not soon forget.

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When the forces of nature conspire to defeat ordinary means of travel, the need for transportation is always most desperate. At such times the Grumman MALLARD demonstrates its unique abilities. As the only executive aircraft to combine the speed of a land plane with the versatility of an amphibian, the MALLARD is depended upon by individuals, agencies and corporations for swift transportation to places where things are happening.

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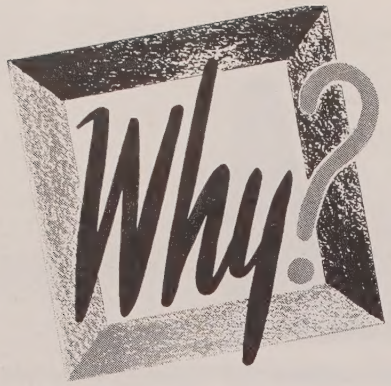

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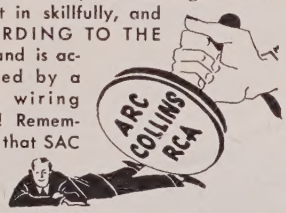

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HANGAR FLYING

Flight Plans

In a recent session in Washington, D. W. Rentzel, Administrator of Civil Aeronautics, assured private pilots that no blanket mandatory flight plan policy covering the entire U. S. was contemplated. As things now stand, pilots flying in or near the two active defense areas now in being, are encouraged to file flight plans. Purpose of these flight plans is to provide identification information on all aircraft penetrating the defense areas. When all of the perimeter defense areas are set up, the filing of flight plans for those areas will be encouraged, but the areas affected will be only a minor part of the total area. At present the two defense areas are: East Coast from Norfolk, Virginia, north to the border; and the Los Alamos atomic plant. Eventually, the defense areas will include the West Coast, the Canadian Border, two other inland areas—Oak Ridge and Hanford, as well as the East Coast and Los Alamos.

Air Markers

Proof of the great value of air markers comes from Capt. Richard F. Perchaff and Lt. L. W. Spear, National Guard pilots from Indiana. The two pilots were on a training flight to Logan Airport, Boston. Because of weather, they could not get into Logan and with only a 15-minute supply of fuel left, they had to select an alternate field. Capt. Perchaff and Lt. Spear spotted a community-type air marker which led them to a 2500-foot landing area at Revere, Massachusetts. Score another "save" for air marking.

Clean Windshields

A report from Flight Safety Foundation warns pilots to clean windshields *before* they refuel their ships. In tests conducted on the cleaning of certain plastic windshields, at was discovered that static electricity was generated. How serious this problem might be is unknown at this time. To be safe and not sorry, however, Flight Safety recommends cleaning aircraft windshields before and not during the refueling or immediately after.

Helioplane Four-Placer

As reported in SKYWAYS several months ago, Aeronca Aircraft Corporation has been designated as contract manufacturer for the new four-place *Helioplane*. This information was given as a "rumor" earlier this year, but is now confirmed by both Aeronca and the Helio Corporation. Under the agreement Aeronca will build the component parts, with assembly operations being carried on at Helio's Norwood plant. The Helioplane's sales and engineering headquarters will remain at Norwood, Mass. Production is expected to get under way next month (July).

Aero Notes

An analysis by CAA discloses today's lightplanes sell best in the Mountain, Pacific, and West North Central states. Reasons given include 1) distances between population centers make aircraft ownership more advantageous than in populated areas of East where saving in airport-to-airport time often does not offset ground travel tin 2) good flying weather found to have stir lating effect on aircraft holdings.

Michigan was one of the leading sta in actions taken against violators of safety during 1949. A complete report sho 35 arrests in Michigan, with a total $1,105.15 paid in fines and costs. Comme ing on Michigan's position, Administra Rentzel said, "The kind of work being do in Michigan under the leadership of State Department of Aeronautics is of gr value to CAA in its efforts to promote safety."

Lycoming is now delivering a new lig weight 125-hp engine to aircraft manuf turers. This new engine has been desig to provide added power for three and fo place lightplanes. Fuel consumption at normal cruising speed of 2250 rpm is ghp. At take-off speed of 2800 rpm, the n Lycoming engine develops 130 hp. Includi generator and starter, the engine weighs o 258 pounds.

Baumann Aircraft Corporation writes is still in business. When Baumann Aircr sold the first prototype of the *Brigadier* Piper Aircraft, many thought Baumann A craft had actually sold out to Piper. This not so. The company is presently busy g ting the Model B-290 *Executive Brigad* into production. The Piper transaction v merely a sale of the No. 1 prototype airpla to Piper for the purpose of expediti Piper's then-planned program of develop a twin-engine tractor-type airplane. Lat word is that Piper has abandoned plans develop a twin-engine ship.

Flottorp Manufacturing Company, Gra Rapids, Michigan, is now manufacturing controllable pitch prop for Continental 65 to 85-hp powered airplanes. The new p has "armor-coated" plastic-covered blad and stainless steel leading edges. This n prop, of Beech-Roby design, will list as as $249.50, and will be marketed through the U. S.

Personnel

Eugene Sibley, veteran of more than 30 ye service with CAA, has been appointed Ch ICAO Division, International Region. . *Santa Monica Aviation* has been appoin a dealer for Beech Aircraft Corporatio *Bonanza*. This firm is based at Santa Mon Municipal Airport (Clover Field), Sa Monica, California. . . . *Thomas F. Pi* has been named Assistant General Mana of Piper Aircraft Corporation. He's a vete military and civilian pilot of 19 years ex rience. . . . *H. C. Pettit* has been m Sales Manager of the Aircraft Division Aeronca. He succeeds *Walter B. St. J* who resigned to take over the Sales M ager's chores of the Aircraft Division Lear, Inc. . . . *R. C. Treseder* and *T. Williams* have been made Assistant C Engineers of Aeroproducts Division, G eral Motors Corporation.

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The world's first mass producer of jets, Lockheed established this leadership with the F-80 *Shooting Star,* America's first operational jet airplane. This fighter, like other Lockheed jets (the T-33 two-place jet trainer and the new F-94 interceptor), is noted for its speed, versatility and strength.

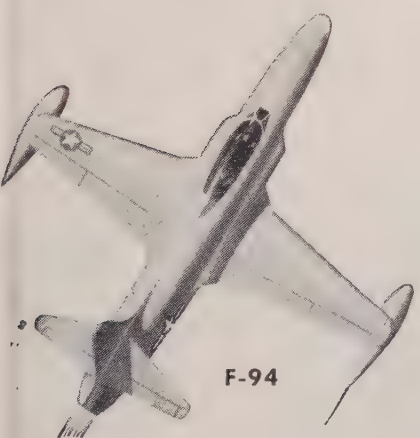
Carrying on this tradition is the newest member of the Lockheed jet family, the rugged, twin-engined F-90 Jet Penetration Fighter, now undergoing evaluation tests by the U.S. Air Force.

This broad experience in the development of practical jet aircraft is invaluable in the Lockheed laboratories where the designs of the future are taking shape today.

LOCKHEED

Aircraft Corporation, Burbank, California

Look to Lockheed for Leadership



PROP WASH

Aero Oddities

No Glide. Student pilot who found learning to fly particularly difficult and who had built up many more than the customary hours of dual instruction, at long last was allowed to solo. He made two successful hops in the morning, returned to the field in the afternoon for another solo session. After two landings in the weeds some 200 feet short of the runway, he was flagged back to the hangar and asked what he was trying to do. "I guess I need a different type of airplane," he replied in all seriousness, "we have a little wind now and this one won't glide far enough to reach the runway." *(A. L. Stephenson, San Benito, Texas)*

Joy Ride. When some unknown airplane jockey in Anchorage, Alaska, went joy-riding in a stolen airline transport one night, police found no dearth of suspects. CAA men estimated that at least 150 pilots in Anchorage alone could have done the job, not to include several hundred more in air force ranks from nearby bases. The DC-3 stolen was used to give the vicinity a thorough buzzing. It was returned to Merrill Field where the culprit escaped before cops got on the job. *(Bob Arentz, Salt Lake City, Utah)*

Area Covered. Aircraft Industries Association reports that the blueprints required for one of the Air Force's big bombers would cover 125 football fields. *(Courtesy of "Plane Views")*

Nose Beam. Pilot flying over his hometown parachuted a pound of Roquefort cheese to his wife as a Valentine gift. Unfortunately, the cheese did not drop exactly where he wanted it to, and, a search failed to locate it. Some time later, a resident noted a strange odor in her backyard, followed her nose and found the cheese hanging from a branch of a tree. Warm sunshine and a change in wind direction combined to locate the cheese a half block from its intended destination. *(G. Palmer, Los Angeles, California)*

Wrong Pew. Flying from Long Beach, California, to Hamilton Field, a pilot attempted to land at Alameda Naval Air Station because of increasingly bad weather and a short fuel supply. Pilot mistook parallel rows of lights for the nearby air base and landed on a pier. *(A. Davis, Long Beach, Calif.)*

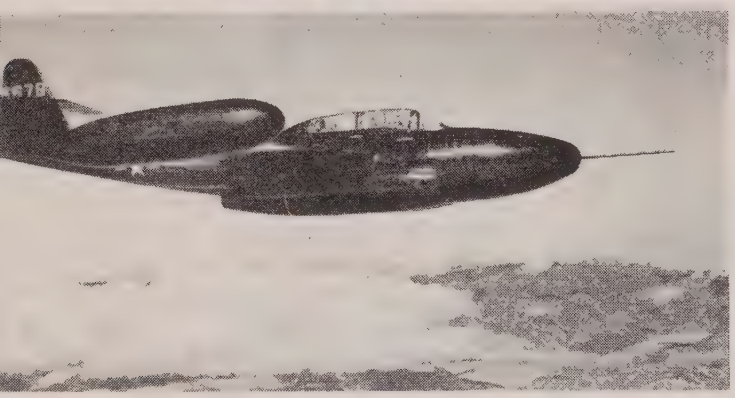
Chilled Student. A flight instructor took a student up in an old open-cockpit Waco for a few aerobatics. Attempting to demonstrate a slow roll, the instructor could not get the stick forward while the ship was inverted. As a result he wasn't able to complete the maneuver. Upon landing, the instructor asked the student if he had been "freezing" the stick. Came the student's reply, "Yer darned right I was. . . . I'd forgotten to fasten my safety belt, and that stick was what held me in!" *(R. C. Marshall, Wichita Falls, Tex.)*

Ye Olde Airplane. An elderly woman being given her first ride in an airplane commented extensively on the number of gages the pilot had to pay attention to and how each gage told him how the airplane was operating. Back on the ground, the woman watched the pilot tie-down the airplane, then gasped, "Goodness me, and you even have hitching posts!" *(K. Coleman, Pittsboro, Indiana)*

Att'n Readers:

If you have any news note oddities pertaining to aviation, send them to SKYWAYS. Box 17, 444 Madison Avenue, New York 22, N. Y. Five dollars will be paid the sender of each "oddity" printed. Contributions cannot be returned unless accompanied by stamped addressed envelope. The decision of the editors is final.

AIR FORCE'S all-weather jet fighter is the Northrop *Scorpion*. It is equipped with radar, carries crew of two



NORTHROP F-89 is powered by two Allison J-35 jet units which give the big and heavy *Scorpion* a speed in the "600-mph category." It has a ceiling of over 40,000 feet and a combat radius of over 600 miles at cruise

By FRED BRETCHER

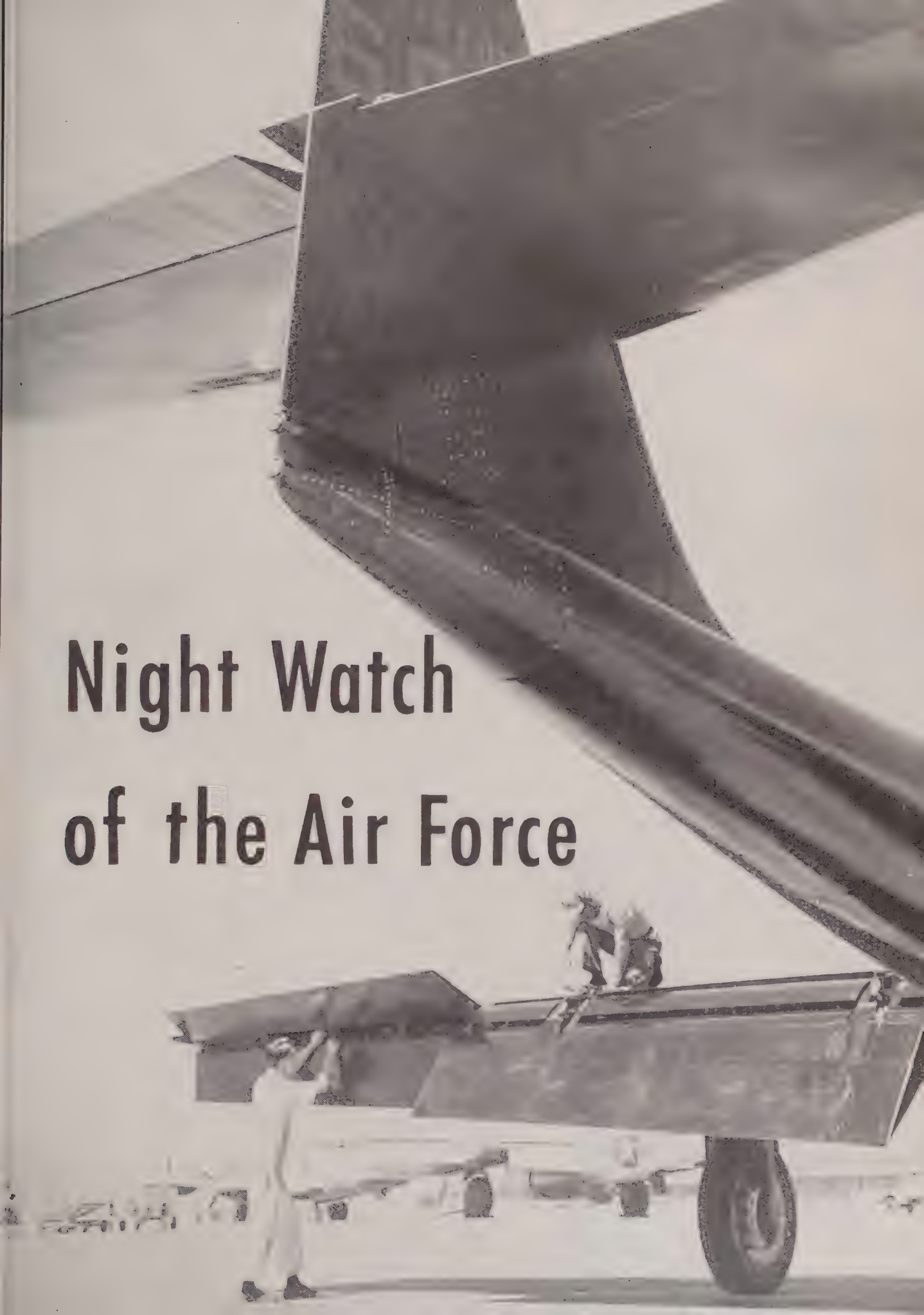
Project Test Pilot, Northrop Aircraft

IT'S BIG and rugged and packs a knock-out punch. That's the F-89, the Air Force's new Northrop successor to the famed P-61 *Black Widow*. I flew the first test hop on this ship over a year and a half ago, and I've been working with it ever since.

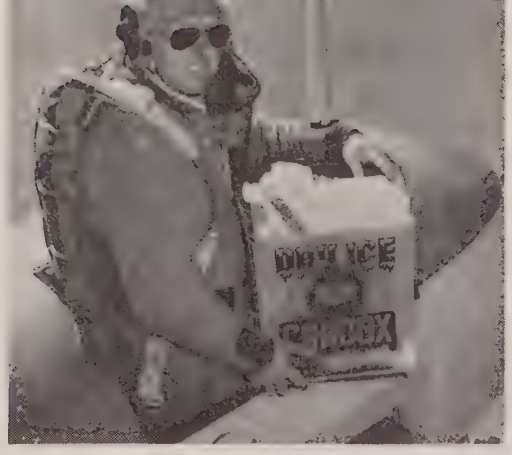
I think the F-89 is one of the best Air Force fighters yet built. The big thing about this ship is its ability to come in on a target fast, practically stop in the air while it fires guns or rockets, and then get away in a hurry.

Other fighters have their slots, slats, dive brakes and flaps—but we slow down the F-89 with "decelerons." They're split ailerons that open up both top and bottom to create a terrific drag when you apply them. The ship slows down so rapidly that I fly with my shoulder harness pulled up snug all the time to keep from (*Continued on page 45*)

TEST PILOT-AUTHOR is Fred C. Bretcher who did the initial testing of Northrop's mammoth 100-ton *Flying Wing*



Night Watch of the Air Force



SEEDER who drops dry ice from Symons' P-38 is fellow Bishop-ite J. McDonald

SYMONS has been flying in the Bishop area for over 20 years, much of that time in gliders. This has taught him to watch wind and weather carefully. Lenticular cloud condition was known to him in 1928

I'm a Rainmaker

RAINMAKER Bob Symons, shown here *(above)* in the cockpit of his war surplus P-38, plants "bonus" rain and snow for California Electric Power Company

By BOB SYMONS

There's no war paint, tom-tom beating or ceremonial prayer in the Kiva, but I'm still a rainmaker.

I don't summon the God of the Winds with symbolic incantations or ceremonial pagan chants, but it nearly always rains after I don my pluvial trappings.

The war-paint camouflage has long since been removed, the tom-tom rhythm has given way to the modern beat of 3,000 horsepower, and the ceremonial prayer has been replaced by 20th century know-how in a Kiva called the Weather Bureau.

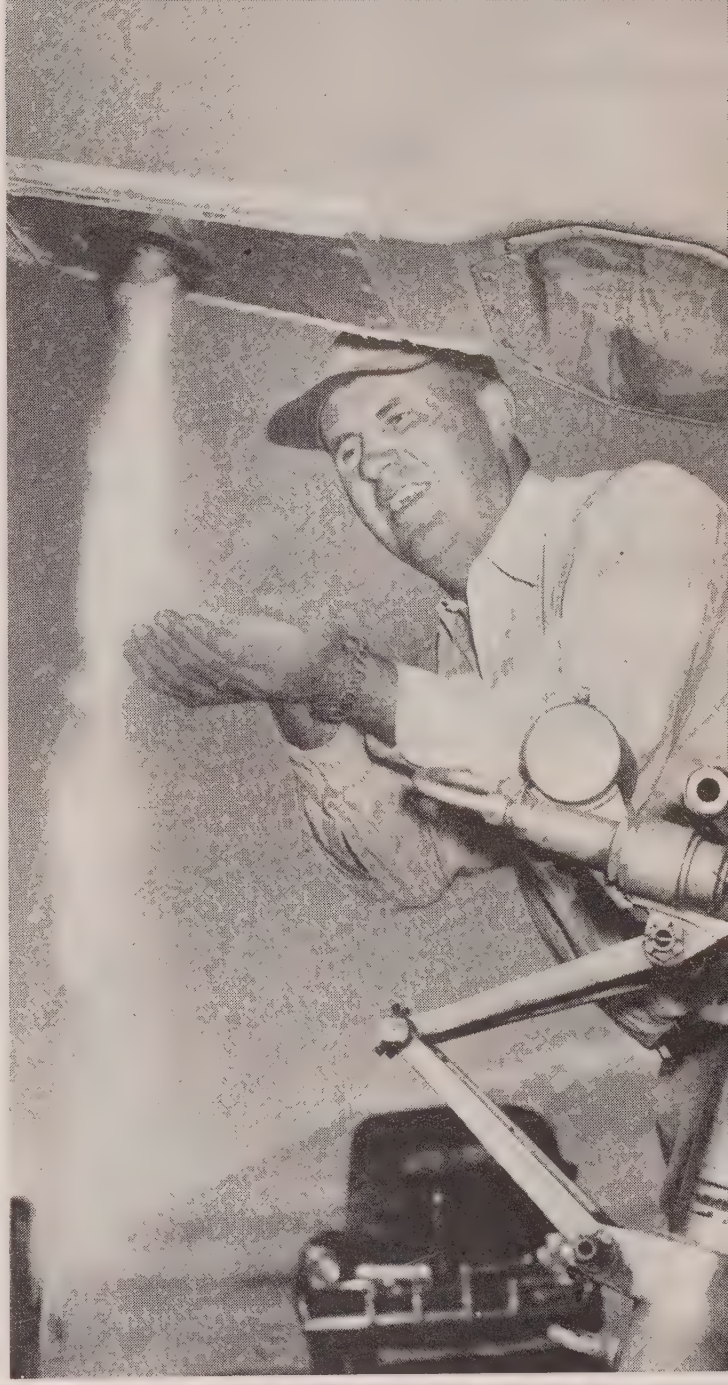
The Piute Indians had their headdress and feathers. I have an

oxygen mask and electric "bunny suit." They had ceremonial moccasins while I wear heated fur-lined boots. They performed by smoky campfires but I do my scientific mysticism at 35,000 feet in the middle of a cloud.

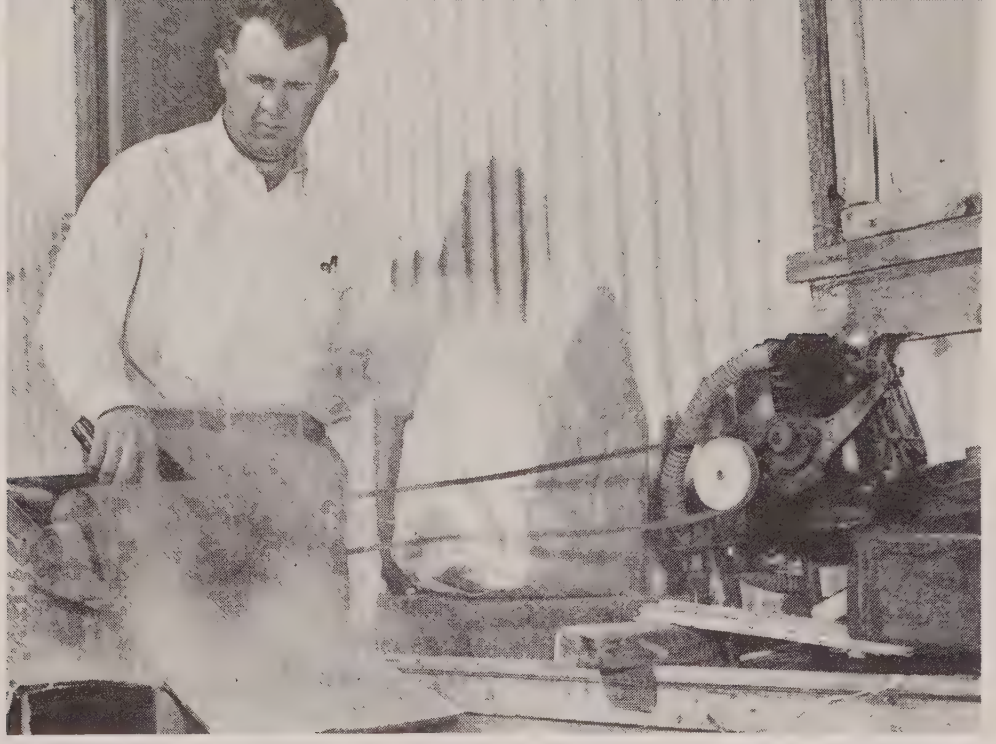
I make most of my rain by dry ice "seeding." My job is to fill the snow cups of the High Sierras to the west of Bishop, California, so that water will run off slowly during the year and develop hydro-electric power. With the ever-present water shortage in the arid Los Angeles area—and more lately in the East—water and power are worth a lot of money.

The technique of rain making is quite simple *if* you have the right kind of clouds. For my purposes, they must be in the right spot since the California Electric Power Company pays my bills to plant "bonus" rain and snow in the lakes and basins feeding into Bishop Creek. Cal-Electric has five electric generating plants in this creek that are fed from the snowfall of a five-by-20-mile area above the 8200-foot level. Naturally, it does Cal-Electric no good if I make it rain or snow 50 miles away, so I've learned to pin-point my snowstorms.

I'm more or less my own boss on this job. When weather conditions look promising, I call Ernest Bulpitt, chief hydrographer. He then contacts power-plant operators by phone to check the weather in the canyon. If the report is promising, I take off in the P-38 and fly to the top of the clouds. Then I drop down into them briefly to check the amount of super-cooled moisture they carry. I can tell the moisture content of a cloud by the amount of ice that sticks to the plane, and then I know how much dry ice to use when I (*Continued on next page*)

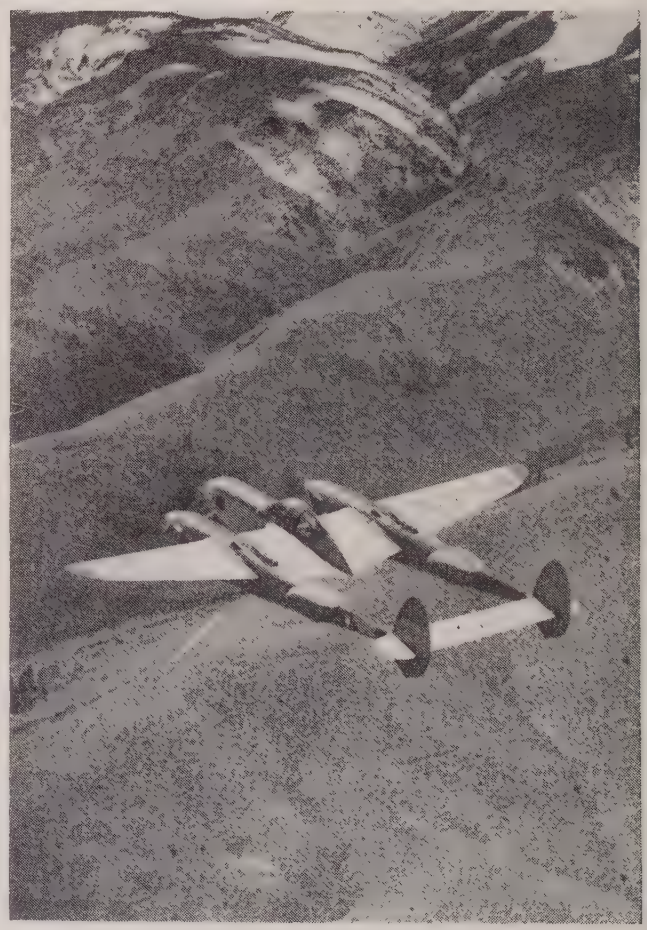


DRY ICE pours out of nose chute in P-38 this way *(right)* when Pilot Symons has climbed his plane to right altitude for "seeding." McDonald and Symons drop anywhere from 20 to 100 pounds of dry ice each trip



CLOUDS averaging 3,000 feet thickness or less are seeded with dry ice the size of rice grains. Pilot Symons grinds the dry ice to the desired size just before he takes off on seeding mission

LOCKHEED P-38 was chosen for seeding work because of its high rate of climb and service ceiling. Symons has seeded clouds from 39,000 feet. First planes he used were a Cessna 140, then BT-13, AT-6



seed them. If there is a lot of moisture in the cloud, everything from the windshield to the leading edges of the wings ices up, but if the cloud is fairly dry, only the prop spinners pick up a little ice.

Sometimes I have to go very high on these flights, which is the reason I use a surplus P-38. My first seeding experiments were made with a Cessna 140. Then I used a BT-13 and later an AT-6, but the 24,000-foot ceiling on the AT-6 just wasn't high enough for some of the clouds in this area. I've been as high as 39,000 feet with the P-38, and it doesn't take me all day to get there. Clouds develop fast in these high mountains, and if I'm to get the moisture out of them where I want it, I've got to have a ship that will go upstairs in a hurry.

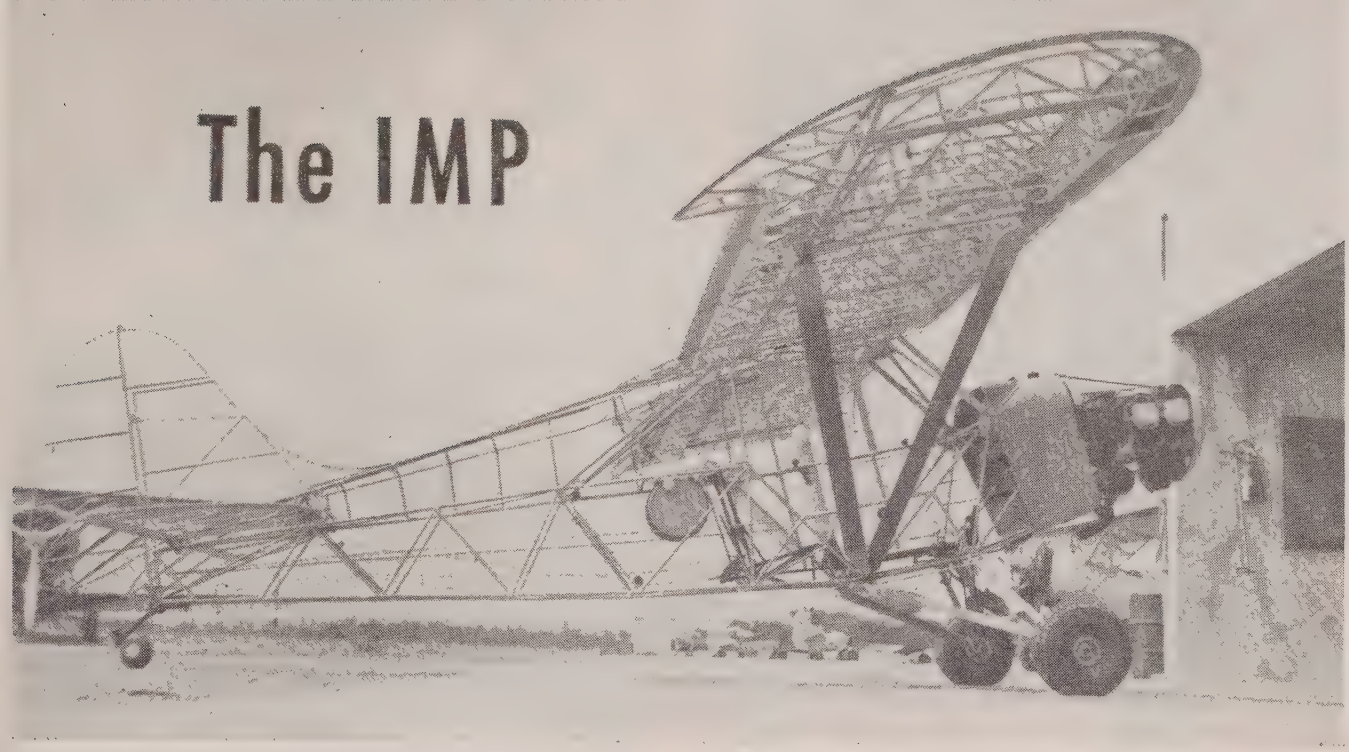
Aside from the fast climb, the P-38 is ideal for this work because of its rugged construction and ever-lovin' twin-engine safety. The turbulence in some of these clouds is really rough. I've had my accelerometer show as much as plus 8 and minus 3.8 G's on these cloud flights.

Some early experimental work was done in Central America where dry ice was loaded into a Very pistol and fired into the heart of a towering Cumulus to trigger the moisture. The Very pistol was used as a "crutch" because the airplanes available wouldn't fly high enough to drop the dry ice through the top of the cloud. With the P-38, we never have resorted to that practice here.

There have been many experiments in rain making but the only operation that I know of in this country, aside from the project here at Bishop, that has worked out consistently over a period of years has been flown by Chuck Barnes of Phoenix, Arizona. He's been seeding the Salt River Valley down his way in a war surplus Bell P-63.

It takes a good basic knowledge of meteorology to make this seeding work out successfully. I've been flying in the Bishop area for well over 20 years now, and much of that time has been in gliders. From that no-engine cockpit, you get in the habit of watching wind and (*Continued on page 43*)

The IMP



THE IMP without her fabric discloses such extra members as double ribs in wings and heavy lift struts. Note smoke tank

HERE'S an aerobatic airplane that really performs. Designed and built at Broward Airport, Fort Lauderdale, Fla., by Roger Hofstra, Earl Snyder and Ben Bradley, the "Imp" has a Piper J-3 fuselage cut down three inches. These three inches were trimmed out between the rear seat and the fin. Gussets were added, wing roots were beefed up, and the fin was shortened and brought forward for directional stability. The original landing gear was used, but the axle was set eight inches forward. When 125-hp Lycoming engine with a McCauley prop was installed, front was shortened nine inches. The "Imp" has 2,000 fpm rate of climb, cruises at 130 mph, has top speed of 140 mph but has been flown as fast as 185 mph. Name practically any aerobatic maneuver and the "Imp" does it—Outside Loop, Half-Roll to inverted Outside Cuban 8, Loop with Snap on top, Vertical Reverse, Immelman, Clover-Leaf . . . or what have you.

PILOT who has done much of the "Imp's" aerobatic flying is Caro Bayley, shown here *(right)* with Ben Bradley

SINGLE-PLACE "Imp" has hand-rubbed finish with 23 coats of dope, one-inch rib stitching; front shortened nine inches

DE HAVILLAND BEAVER was flown by the author and Speed Nolta *(above, right)* for this detailed pilot's report. In demonstrating short-field take-off, the *Beaver* was up and out of the field at Bishop in substantially under 800 feet

De Havilland custom-designed the Beaver to meet pilot requirements

By DON DOWNIE

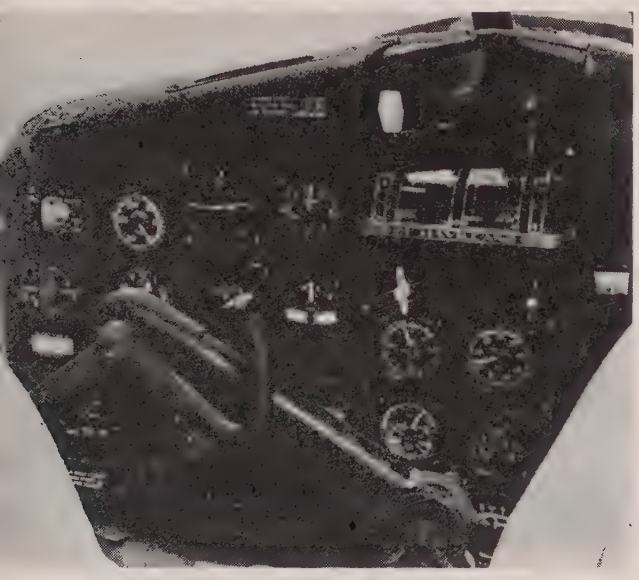
HERE'S a "pilot-requested" airplane.

It's a three-quarter-ton flying pick-up truck with ample room in the cabin for seven people, 200 pounds of baggage, and fuel for 500 miles.

The Canadian-built De Havilland *Beaver* is custom-designed to the requirements of the Far North "bush" pilots. One pilot wanted a cargo door large enough to handle a 52-gallon fuel drum in either direction. Another wanted the oil filler neck inside the cabin for cold-weather operation. A third wanted the fuel tanks in the bottom of the fuselage to speed refueling on floats. A fourth asked for

Pilot's Report...DH Beaver

TAKE-OFF from Arcularius Ranch (elevation—7100 feet) was another short-field demonstration. Note rudder deflection to counteract torque. The "Bishop Wave" clouds hugged the Sierras when *Beaver* took off for trip home



PANEL PHOTO of the *Beaver (above)* was taken in flight during "Bishop Wave." Altitude: 10,800 feet; manifold pressure: 17½ inches; rate-of-climb: 2500 fpm. Feature of *Beaver* is its quickly removable battery unit *(lower right)*

extra doors into the pilots' seats for entry when the cabin was filled with freight.

The *Beaver* has all these and more. A surprising amount of design work has gone into this workhorse. The ship is all-metal to cut deterioration. The baggage compartment sticks aft beyond the back seats to handle a 10-foot prop and long diamond drills. The battery disconnects as a unit aft of the baggage compartment and pulls free of the airplane with a minimum of effort so that it may be stored in a warm place overnight. There's even a built-in cargo drop hatch and camera hole at the back of the baggage compartment.

For a report on one of the most "workable" planes in the air today, come along on this SKY-WAYS' trip with the (*Continued on next page*)

DOORS on the *Beaver* are quickly detachable. Note the gas tank caps set into fuselage just above the ship's strut

Beaver. Exclusive sales agent for the United States and its possessions is the Babb Company of Glendale, California. Charlie Babb made his *Beaver* demonstrator, N93299, available and asked Hollywood film pilot Floyd "Speed" Nolta to go along and check us out on the big 48-foot freighter. Nolta is a member of the Associated Motion Picture Pilots Assn. and has flown in over 100 pictures in the past 12 years. He flew the B-17 in "Command Decision" and "Fighter Squadron" and did the P-40 antics in "God Is My Co-Pilot." He has over 11,000 hours and still keeps a log book.

To make the flight as near actual full-load conditions as possible, we filled the cabin with our wives, two other pilots and Nolta's 10-year-old son. Then we headed out on what proved to be a most interesting and somewhat hair-raising weekend.

The *Beaver* is a big airplane, but it didn't look like it when parked at the Grand Central Airport beside a Northwest Airlines DC-4. The 450-hp Pratt and Whitney *Wasp Jr.* engine is probably the best-proved engine of its type yet assembled. This same basic powerplant had hundreds of thousands of hours testing in the nose of BT-13 wartime trainers. The propeller is a reliable Hamilton Standard constant-speed unit.

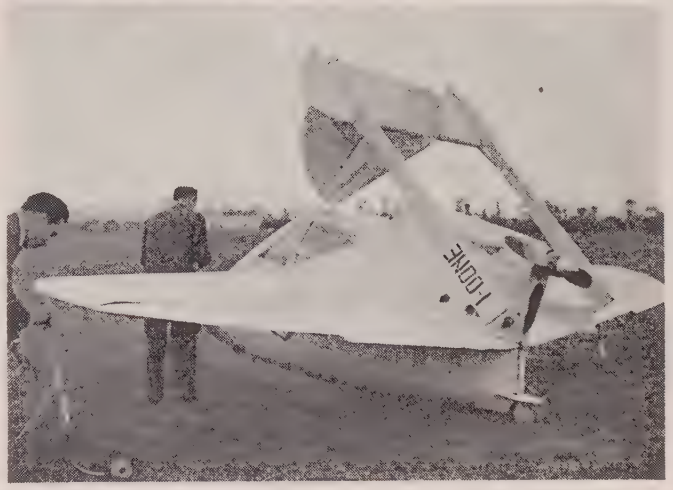
Inside the cabin, you quickly get the idea that the *Beaver* is no plush job. The back seat will hold three passengers but it is merely a hammock-type canvas sling across the aft of the cabin. However, it is quite comfortable. Midway in the cabin are two seats set into the floor with quickly detachable "wedjit" fasteners. The right front seat is also removable, but the pilot's *(Continued on page 48)*

HIGH SIERRAS looked like this to the seven *(below)* who rode the *Beaver* to Bishop. Photo was made near Inyokern at altitude of 9,000 feet. The *Beaver* climbed to that altitude from below sea level in less than 10 minutes at over 1200 fpm

THE *Aerocar* is now flying and in the test stage. Designed and built by Moulton B. Taylor, president of Aerocar, Inc., the roadable two-placer is powered by 100-hp Franklin engine and has a cruising speed (air) of 100 mph and an air range of over 300 miles. For use as a car, the *Aerocar's* wings and tail surfaces are detached. The "convertible's" designed road speed is red-lined at 50-mph; it has a road range of over 500 miles.

ROADABLE

ITALY'S "roadable" should be called "towable," because the airplane cannot travel under its own power on the road. Instead, it is designed to permit towing behind an auto. Called Alaparma 65, the plane is an all-wood two-place pusher lightplane that is powered by 65-hp Walter *Mikron* engine. It cruises at 112 mph and has a cruising range of 434 miles. The plane features a folding tail which permits towing, and a central wheel landing gear.



CONVAIR-TURBOLINER is America's first turboprop transport and is due to begin its flight tests early this summer

Air Transports' Next Step

PURE JET AIRLINER, the first to fly, is England's De Havilland *Comet (above)*, a four-jet 48-passenger transport due for delivery to BOAC in late 1951. Great Britain's prop-jet airliner is the 40-place Vickers *Viscount (below)*

By COL. N. F. SILSBEE

BACK in 1940 we cruised at 175 mph and thought we were going places in a hurry. Today speeds of 275 to 300 mph in our postwar airliners are commonplace. The big question now is: Will the next jump in speed be to the 350-400 mph bracket with the turboprop or to the 450-500 mph category with the turbojet?

One answer is that we shall probably get both, as far as initial jet runs on special routes are concerned. Despite the admitted problems involved in jet-airliner operation, *i.e.*, air-traffic control at the high speeds involved, lack of flexibility of the jet

powerplant, high fuel consumption, passenger hazards from rough air in high-speed flight, etc., operational testing of the jet-powered British *Comet*, Avro *Jetliner*, and the *Tay-Viscount* are going forward on schedule, and a number of these or improved versions of these aircraft will see limited commercial service by 1953.

It is our opinion, however, that these will be the exception, and that the turbine-propeller models will be in the saddle for a time, especially in the medium-capacity, medium-range category. In the sense that Britain already had four such aircraft in the air, totaling hundreds of hours of flight time, her definite lead time-wise is not subject to argument. These include the *Dart-Viscount* and *Mamba-Apollo* in the medium class, the larger *Theseus-Hermes*, and the *Mamba-Marathon* twin-engine feeder plane. A modified C-47, the *Mamba-Dakota*, is also being flown, and this is regarded as a promising DC-3 replacement on many of the world's airlines, probably apart from the United States.

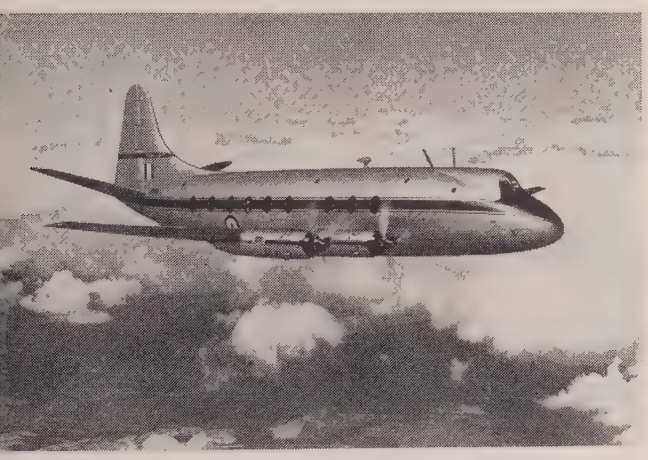
However, with the announcement of the U.S. Navy-Allison developed T-38 turboprop, closely followed by the further announcement that the Allison Division had purchased from Consolidated Vultee Aircraft a *Convair-Liner* for the immediate installation of two of these 2750-hp units, a new turn of the wheel is indicated.

The *Convair-Turboliner* will thus be America's first turboprop transport. The modification and preliminary flight-test program will be accomplished at Convair's San Diego plant, after which the airplane will be flown to Indianapolis for extensive flight test by Allison to accumulate operating data on the reliability and economy of turbine-powered airliners.

Convair officials, including board chairman Floyd B. Odlum, and President LaMotte T. Cohu, are confident that the *Turboliner* will be flying by midsummer. This is confirmed by the technical judgment of two top engineers, R. C. Sebold, Convair's director of engineering, and Frank Fink, chief engineer of the San Diego division.

Five years ago, while the writer was at Convair's Fort Worth plant in connection with the press demonstration of the B-32, he discovered in an off-the-record chat with vice-president "Mac" Laddon that Consolidated Vultee was very much interested in the turbine-propeller powerplant, both for military and commercial use. The XP-81, with General Electric's 2200-hp TG-100A turboprop in the nose and I-16 turbojet as tail booster, was well along in development and was first test flown just before the end of the year. The 240 airliner was also coming along, and it was definitely in the cards that this airframe was well adapted for the installation of turboprop engines as soon as this country had a unit of the required power and efficiency.

Convair officials believe that turboprop transports are a logical step in airline progress because the vast public investment in airports, airways, and traffic-control systems is geared to propeller-driven aircraft; the new planes will fit neatly into today's traffic pattern because fuel economy is such that these planes can carry ample reserves to meet CAA requirements; they can also remain in stacked positions for long periods when required to do so because of weather or traffic conditions—a performance which pure- (*Continued on page 55*)



AVRO JETLINER is Canadian-built turbojet transport due to fly Atlantic in August to take part in 1950 Farnborough Show. Convair's second turboprop experiment is the XP5Y-1 flying boat *(below)* powered by four Allison T-40's

WEATHER does not hold up special Missions Squadron. Here Capt. C. Fitzwaters, C.O., scans late weather map

By M/SGT. PATRICK MORIARITY

HEADQUARTERS, United States Air Forces in Europe: — "GCA Orly Field—this is baker seventeen-6787. We are flying at two thousand on a heading of zero nine zero. Do you hear us?"

The duty operator leaped to his feet, grabbing the microphone and answered, "Baker seventeen-6787, this is Ground Control Approach, Orly Field.

PLANE CHECK is in hands of T/Sgt. Frank Uriah *(left)* and M/Sgt. Lester Stadt. They go over every inch of the C-54 before it is towed out to flight line. Special Missions Squadron also operates ambulance L-5's in Germany

Special Missions USAFE

CREW CHIEF of Lt. Gen. John Cannon's B-17 "Cannonball" is M/Sgt. Gene Short *(right)*, working with Sgt. N. Byrnes

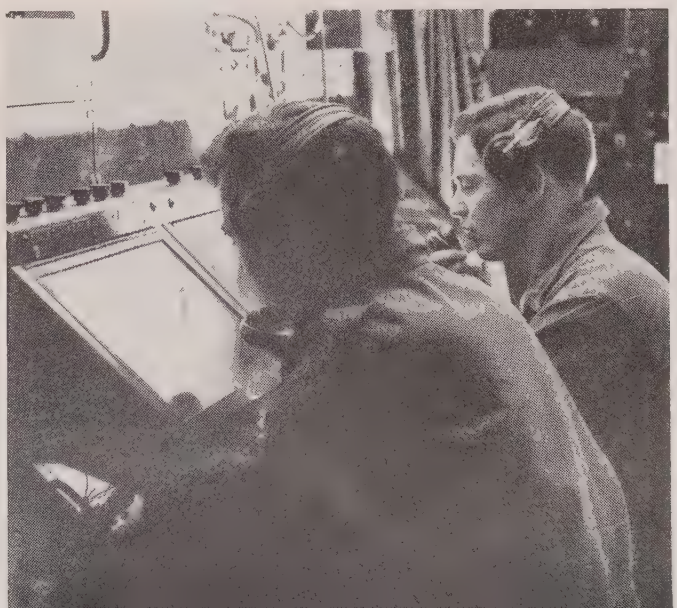
We have one of the worst fogs on record down here. Suggest you go some other place to land."

"What a shame—a bad fog in a nice city like Paris. We've business down there and we're coming in. Have you picked us up on your radar scope yet?"

"This is one I've gotta see," the operator grumbled to himself as he alerted the rest of his crew to begin the tedious task of guiding the aircraft to a safe landing.

Two thousand feet over and some miles out of Paris, the pilot of baker (*Continued on page 44*)

GCA CREW *(below)* talks fog-blinded pilots to safe landing. During 1949, Squadron flew 1,332,360 air miles. Part of job is flying movie stars, like Gene Raymond, Jeannette MacDonald shown here with Constance Bennett, in for shows



New Cessna 170

PERFORMANCE of the 1950 Cessna 170 is similar to that of the 1949 model . . . both good. New cowling eliminates slip-stream buffeting that was noticeable in the back seat of 1949 model. The plane's visibility is excellent

RUBBER engine mounts in addition to old motor mounts cut down on vibration in the new 1950 Cessna 170. Improved mounts are called "rubber vibration eliminators"

PILOT showing off new ship points out another "added" feature: more soundproofing behind the firewall and along the sides of the fuselage in the 1950 Cessna 170

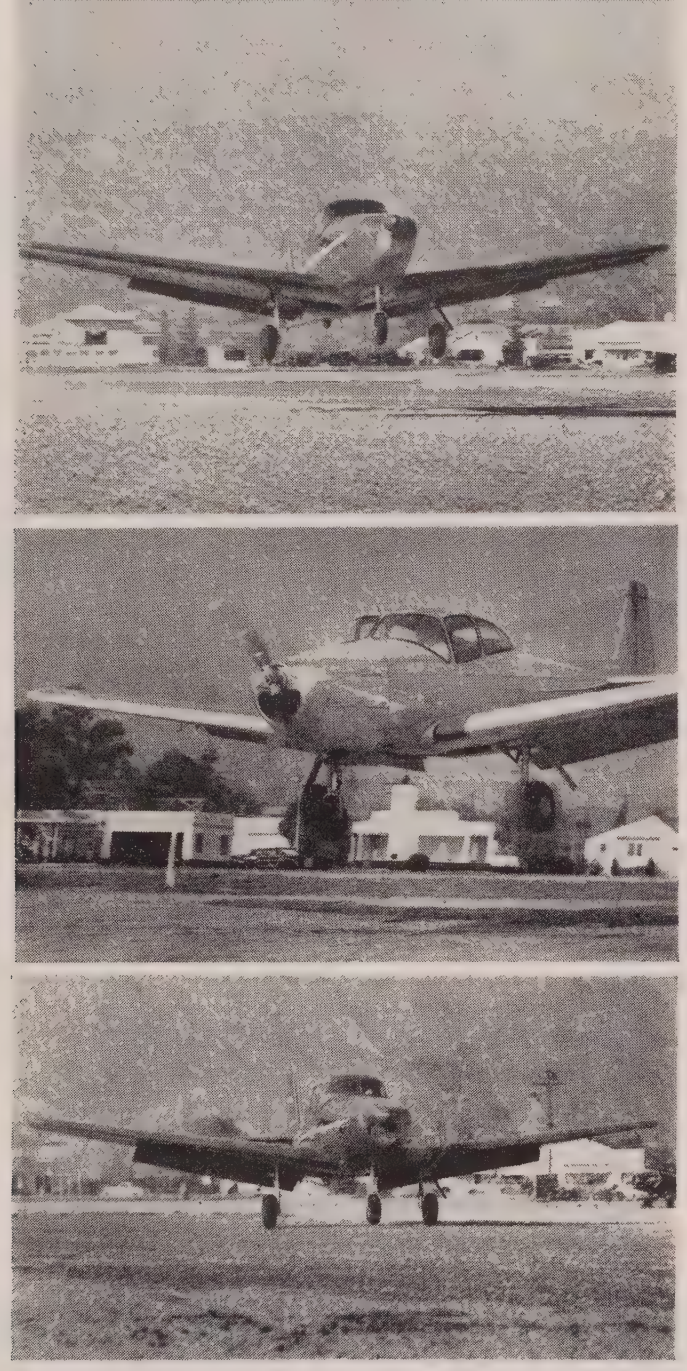
INSTRUMENT PANEL on the new model is reported to be an improvement over the older models. All gages are easy to read, and instrument lighting is called "very good"

CESSNAS parked side-by-side show aerodynamic improvement in 1950 model *(foreground)*. Note lip on cowling on 1949 model that has been removed on the 1950 model

APPLE VALLEY INN was recent scene of Cessna meeting where new 170 was on display on lawn in front of inn. Single landing light on left wing is standard equipment

THE new Cessna 170 for 1950 might aptly be referred to as a "refined" 1949 model. Cessna has made a minimum of modifications in the 1950 four-placer, and the improvements are mainly minor refinements. Most striking change is the optional paint job ($275 extra). Aerodynamically, most important change is in engine cowling design which eliminates slip-stream buffeting that was noticeable in the back seat of older models. Lip of the cowling has been removed, and cowling itself enlarged for better engine cooling. Cabin is soundproofed better. Performance-wise, it's still a good airplane.

LANDING GEAR on the new model is same as on old. With this spring steel gear, pilots report the ship can be landed on roads or rough terrain in absolutue safety



Pilots, Brush up Those Landings

Understand the fundamentals in landing a plane . . . and keep out of trouble

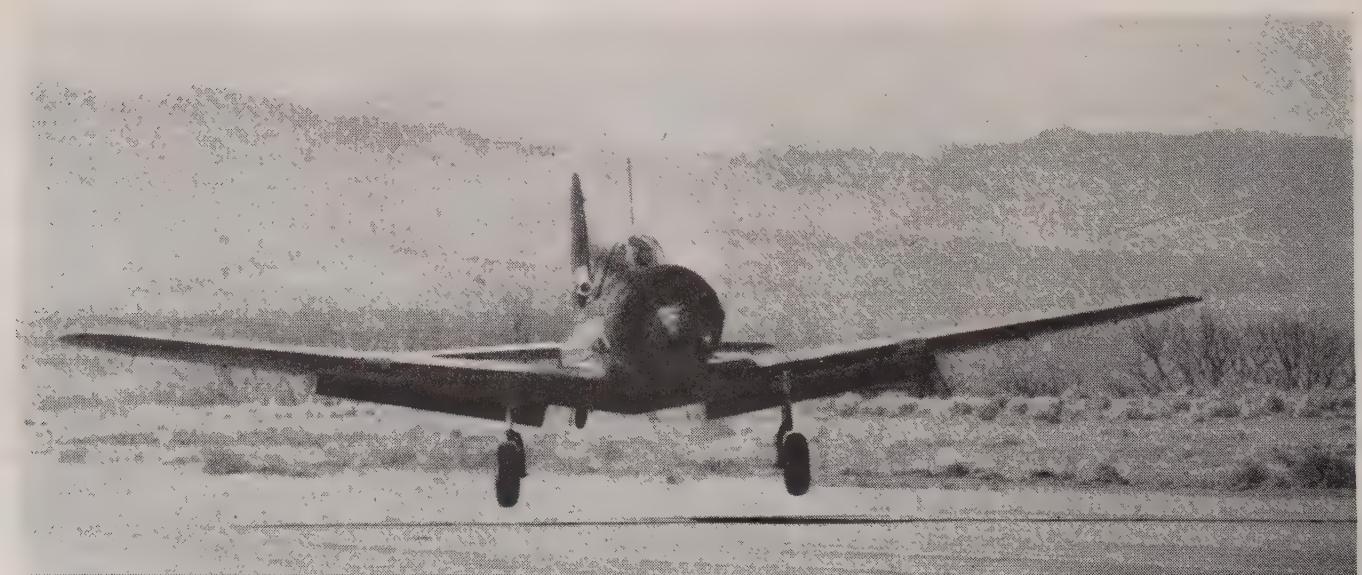
By GLORIA HEATH

IF "a good landing is any one you can walk away from," pilot readers stand up and take a bow, for on that basis the record shows that less than 1 per cent of all landings are "bad", *i.e.* sufficiently bad to permanently stop the pilot's breathing! Before you burst with pride, however, here is the shattering truth if you take the more conservative stand that a *good* landing really *shouldn't* involve an accident: from 33 to 39 per cent of all non-aircarrier accidents (or in the last year about 3500) occur on landing! And if precautionary or emergency landings are included, the figure jumps to the 60 per cent mark, with the picture further blackened by the incidence of fatalities.

No worse reflection on the newer pilots than the "old timers," this percentage has held pretty constant through the years (1938—39 per cent, 1944—38 per cent). Nor does the trouble appear to be dependent on pilot experience, for the accidents are

LANDING a *Navion* three ways is shown here. In the top photo, pilot is landing nose high with partial flaps; in middle photo, pilot is coming in too nose-low for tricycle-gear plane. Bottom photo, pilot is landing flat

CROSSWIND landing in an old BT-13 goes like this. Pilot has dropped right wing into wind, is kicking tail around



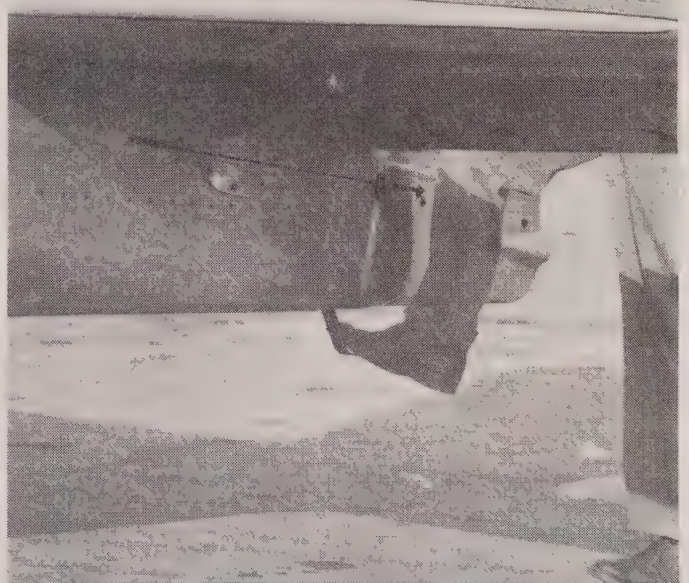
spread fairly evenly throughout the entire flying group. In 1947, 31 per cent of all landing accidents occurred with student pilots at the controls. That year student pilots comprised 31 per cent of the total pilot group. Private pilots numbered 40 per cent of the pilot group and accounted for 44 per cent of the landing accidents. Commercial pilots, 29 per cent of the total number of pilots, had 23 per cent of the landing accidents. Looking at the record may give some clue as to just what ingredients of the landing appear to be causing the trouble: 51 per cent of the landings went sour *after touchdown,* on the landing roll; 22 per cent on the approach; 22 per cent on the level off; and 5 per cent on the go-around.

The training manuals go into detail on just how each of these phases are best accomplished. In addition, however, there are some fundamentals which should be clearly understood in order to avoid trouble: what happens in terms of aerodynamics when a landing is made; what assistance does trim, crosswind and tricycle gear give; what are the important factors in making even a serious emergency landing survivable?

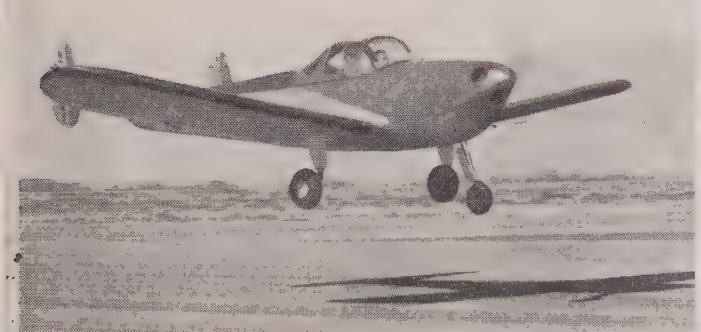
We learn that in a conventional landing the procedure is 1) to establish a glide, 2) start a gradual change of attitude and reduction of speed by back pressure on the stick when "over the fence" until 3) the tail wheel is the same distance from the ground as the main wheels just before contact with the ground and simultaneous with reduction of flying speed to the stall point. But—what are we actually doing in terms of lift? Why do we follow this procedure? And what techniques can we practice to get the "feel" of a landing? In the air the wings support the airplane and your concern is primarily with airflow over the wings. A related factor is the *attitude* of the airplane. Increasing the angle of the wing in relation to your flight path will give you more lift, (*Continued on page 50*)

THREE-POINT landing shown here in a war surplus BT-13 is just about perfect. Note the pilot is using 20° flaps

PILOT wanting to turn *Navion* around on wet ground does so by standing on the tail skid, raising nose wheel clear

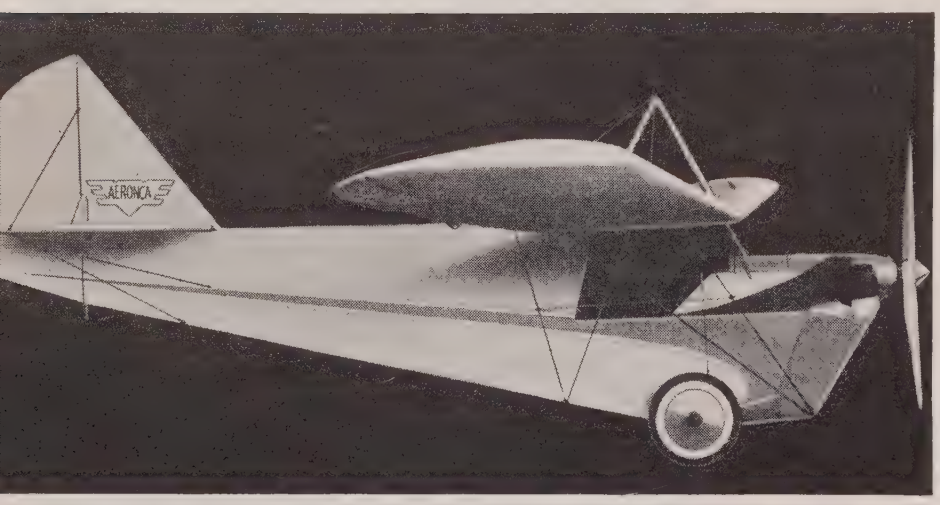


ERCOUPE, the two-control model, is shown here landing flat. New model *Ercoupe* offers three-control, optional



Remember These?

PITCAIRN MAILWING was an aerial trailblazer back in 1930, '31. A three-place open-cockpit biplane, the *Mailwing* was powered by a 300-hp Wright *Whirlwind* engine and had speed of 150 mph. Its maximum range was about 600 miles. This model shown here (*left*) was used to carry the mail before passenger transports came into being. It pioneered the development of today's airline networks.



AERONCA C-2 came into being in 1929, and was originally designed as a military plane to be "put on" by an infantryman and flown behind enemy lines. A single-place high-wing monoplane, it was powered by 26-hp engine built by Aeronca. It had cruising speed of 60 mph, a range of 100 miles, and landed at the slow speed of 25 or 30 mph. A later model, C-3, looked like the C-2, but carried a pilot and passenger and was powered by 36-hp engine. The *C's* were called "The Flying Bathtubs."

CURTISS CARRIER PIGEON built by Curtiss Airplane Company was a product of 1920 and was the first airplane to be specifically designed and built to carry mail. It was powered by a 420-hp *Liberty* engine, the engine designed and built within a few weeks to power World War I aircraft. The *Carrier Pigeon* carried 1,000 pounds of mail in its deep-bellied fuselage, and had a cruising speed of close to 105 mph.

U. S. NAVY claimed this one as one of its speedy fighters back in 1923. Designated the F-2-W, it was designed and built by Wright Aeronautical for entry in the Pulitzer Prize Race. This plane and a sister ship placed third and fourth in the contest, averaging about 230 mph to the first and second-place winners' 243 mph (Curtiss planes). The F-2-W later was modified as a seaplane to enter Schneider Cup race. It was powered by 710-hp Wright.

CURTISS ROBIN was a three-place high-wing monoplane built in late 20's, early 30's. It was powered by 185-hp *Challenger* engine and had cruising speed between 80 and 90 mph. Its range was given as some 300 miles, and it had a gross weight of 2600 pounds. It was in a nine-year-old *Robin* that Douglas "Wrong-Way" Corrigan flew from New York to Ireland in 1938. He made the Atlantic crossing in 28 hours.

HELICOPTER, vintage of 1929, was designed by M. B. Bleecker (shown here standing alongside his flying machine), and built by Curtiss at its Garden City, Long Island factory. Designated the Curtiss-Bleecker SX5-1, the helicopter was powered by a Pratt and Whitney *Wasp* engine of 450-hp. The 'copter had two seats, a total wing area of 322.4 square feet, and four four-bladed propellers. Pratt and Whitney *Wasp* engine that powered the 'copter was mounted in an horizontal position.

STINSON DETROITER was another mail carrier, this one of a 1930 vintage. Designated the SM-1F, the *Detroiter* was powered by 300-hp Wright engine. A six-place "transport," the *Detroiter* cruised somewhere between 110 mph and 120 mph, and had a maximum range of 500 miles. It had a gross weight of 3500 pounds. The *Detroiter* was used on some of the early airline routes. Stinson built six-, eight-, 10-placers until 1936.

GWINN AIRCAR was a product of 1940, 41, and was one of the first planes to employ tricycle landing gear. Powered by 130-hp Popjoy *Niagara V* engine, the *Aircar* claimed a cruising speed of 123 mph, a top speed of 136 mph and a range of some 500 miles. It had a landing speed with flaps of 49 mph. The *Aircar* toured the nation in demonstration of its built-in safety, but never actually went into production.

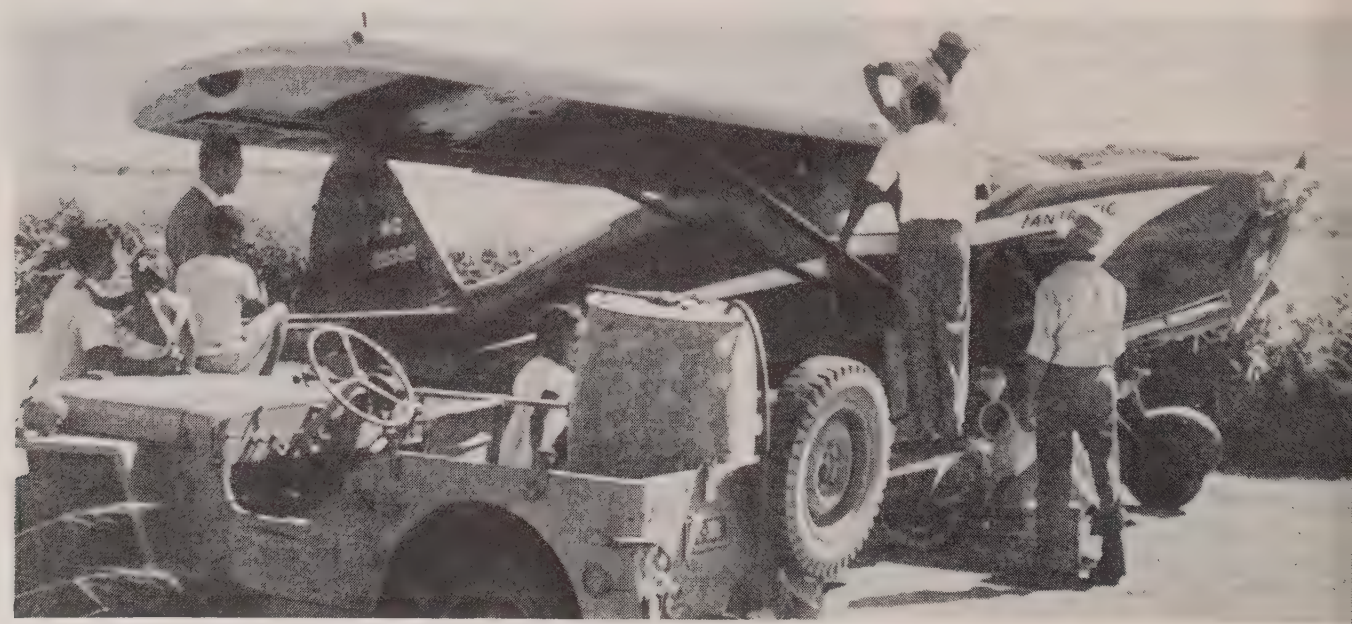
FANTASTIC and her crew of three reached Santiago just after sun-down; were welcomed by Cuban soldier on duty

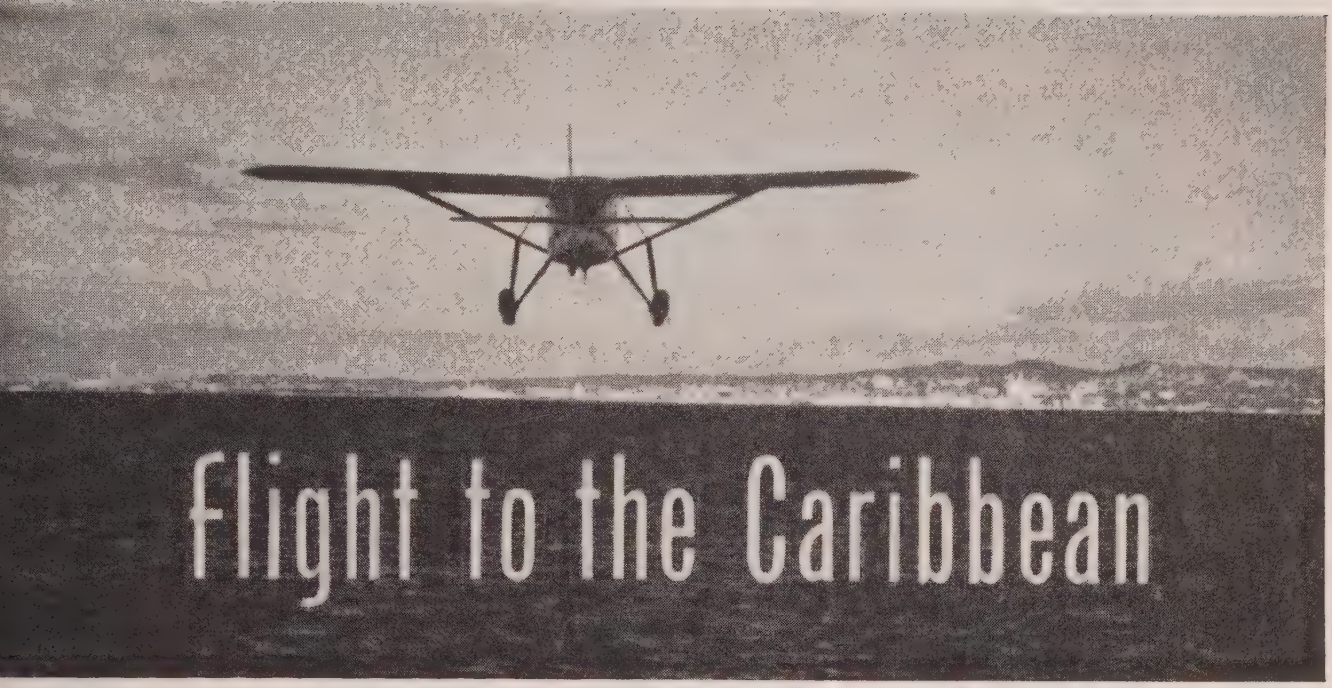
TRIP UP eastern coast of Martinique was made in heavy rain, caused by trade winds cooling over the mountains

PILOT-AUTHOR Henrion holds French as well as American flying license. He did much of the maintenance work on "Fantastic." Stopping at St. Croix to refuel, the Fairchild's gasoline was delivered in drums in airport Jeep

By MARC E. HENRION

FOR a long time it had been my ambition to fly my Fairchild 24, affectionately named "Fantastic," through the picturesque and romantic Caribbean islands. Being a student at the Harvard Business School, I saw that the only possibility of fulfilling that ambition would be during Christmas vacation. Two other graduate students, Henry Hood and Alain Dunand, decided to go along on the trip. Neither of them had any flying time, but both were eager to work, so while Henry handled all the paper work, Alain became our photographer





Flight to the Caribbean

APPROACH to the airport at Port-au-Prince in Haiti was made over the town's beautiful bay. Fee at the International Airport at Port-au-Prince was a mere (!) $15.00. Boys left Port-au-Prince for St. Croix on December 22

and Spanish interpreter, and I did the flying.

In spite of weak finances and time limitations, we wanted to see the islands of the Greater and Lesser Antilles and the Bahamas. Friends at school didn't hide their skepticism of our plans, so the success of the trip became a matter of pride.

We wrote many letters, obtained all the available information and received the clearances necessary to enter and fly in the different countries. We carefully inspected "Fantastic" and simonized it thoroughly. Its new Ranger engine (175) and Aeromatic propeller were re-tuned, the two-way radio and the M.N. 26 radio-compass were checked, the magnetic compass compensated, and a new turn-and-bank, a gyro-compass and an artificial horizon were installed. We had gathered the lightest possible equipment: a two-man life raft with K-rations, three Mae West jackets, three parachutes, a fishing kit, a set of flares, a sleeping bag, a tool kit, rope, thermos bottle, binoculars, and our personal gear.

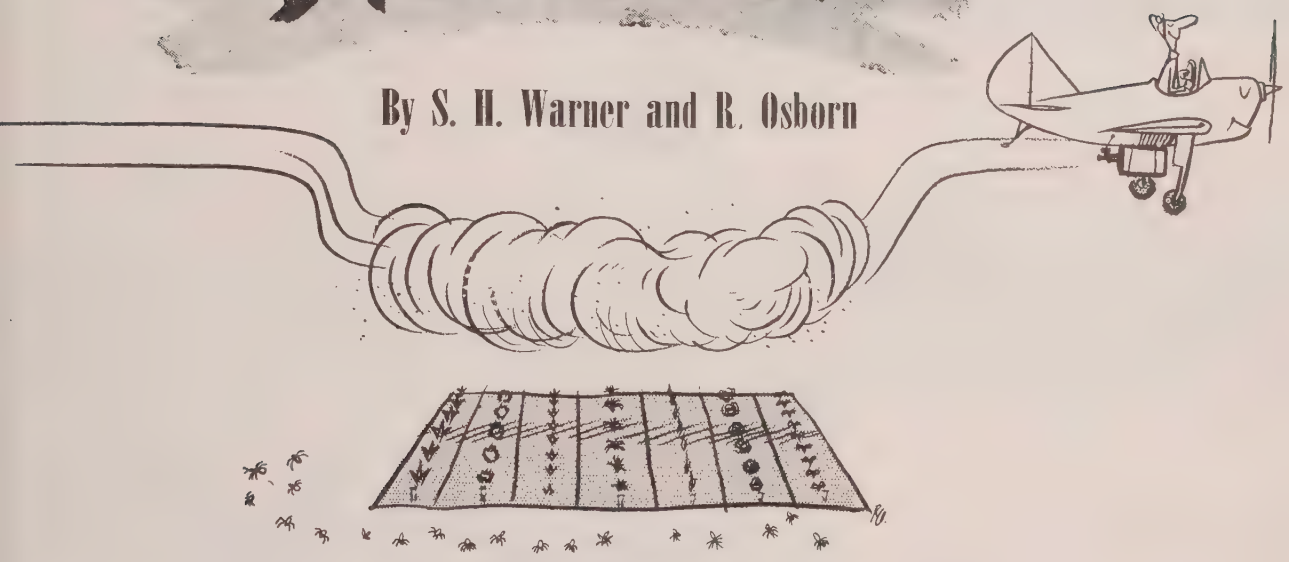
Our day-to-day itinerary started immediately after our last class and was to bring us to Martinique for Christmas and back to Harvard for the first day of school in January; a 6,000 mile trip over more than 30 islands and in and out of 26 airports in just 20 days. We took off on December 15, and after several refueling stops and an RON, we reached Miami. That uneventful trip gave each of us a chance to become accustomed to our respective assignments. While I did the flying, Alain in the co-pilot's seat helped navigate and kept the camera handy. Henry in the rear seat kept the log of the trip, computed (*Continued on page 54*)

PILOT for entire trip was the plane-owner Marc Henrion *(above, left)*. Alain Dunand was the navigator and Henry Hood was in charge of photography. Boys' equipment *(below)* included life raft, Mae Wests, flares, parachutes

"What-wind-where Dilbert would be a good pilot if it weren't for his head"

DILBERT

By S. H. Warner and R. Osborn



Patent Applied For—It all started when Dilbert was given instrument clearance on the first leg of a X-C. Just before he stuck his nose in the soup, he noticed that his Gyro Horizon was dead. He fiddled with it a few moments, then realized it was no use and shifted to his Turn-and-Bank Indicator. Horrified, he saw that something had smashed his Turn-and-Bank. It, too, was useless. That's when the galloping goose pimples took over.

For a long moment Dilbert thought he really was in for some "blind" flying. Then he saw a patch of ground below. Diving through this hole, he swung around and headed back for the barn. Nervous reaction had set in by the time he arrived; he was so weak he could hardly get out of the plane.

When he tried to impress his buddies with the close shave he had had, all they said was, "Why didn't you inspect your plane before take-off?"

Strange as it seems, Dilbert had been so shocked by this emergency that he couldn't throw it off. For days he brooded. He would wake up at night in a cold sweat—sometimes on the floor, after he had bailed out of bed. As it turned out, these were only labor pains, however. At the end of a week he gave birth to an idea which, as he proudly explained to the boys, "will revolutionize flying."

Goaded into disclosing more, Dilbert dramatically dangled before his skeptical audience a short piece of cotton twine, to one end of which was tied an iron stove bolt. "It may not look very fancy," he said, "but when you see how this invention works, you'll kick yourself in the pants for not having thought of it yourself."

Dilbert now had them goggle-eyed and tongue-tied. He continued, with gestures. "You just hang this bolt in front of you, in the middle of the cockpit. When it swings to the left, like this, you're in a left bank. Right; right (*Continued on page* 64)

1. On which side must you pass when overtaking an airplane?

2. If accidentally splashed with aviation gasoline, what immediate first aid measures should be taken?

3. Is it necessary to taxi at high rpm to avoid fouling your engine?

(Answers on page 64)

Operational Engineering

Service Notes : Piper Pacer

Proper understanding of the mechanics of an airplane—its systems, components and upkeep—contributes as much to the safety and pleasure of flying as a knowledge of flying itself. Some of the service notes SKYWAYS brings to your attention emphasize maintenance, some the mechanical features of the plane. All may be important to any pilot at some time, either in an emergency or in the normal course of flying. The following notes apply to the three versions of the new four-place PA-20 Piper *Pacer.*

Types

The Piper *Pacer* 115 is equipped with a Lycoming O-235-C1 engine rated at 108 horsepower at 2600 rpm. The *Pacer* 125 and 135 are equipped with the Lycoming O-290-D engine rated at 125 horsepower at 2600 rpm. The 115 and 125 have Sensenich fixed-pitch wood props; the 135 has an Aeromatic with altitude control.

Ground Operations: Routine Servicing

Fuel System: The *Pacer,* all versions, is equipped with two 18-gallon tanks, one in each wing. The tanks are drained individually and cannot be used simultaneously. *Fuel in the right tank should be used only when the airplane is in level flight.* Since the outlet for the fuel supply is at the front of the right-hand tank, when the plane is in a climbing attitude fuel will not flow to the engine. The right-hand tank should be for auxiliary use.

The fuel gages for the wing tanks project below the wing fabric under each tank. They should be cleaned and drained occasionally so that the indicators are always clear. To drain the gage, empty the tank of fuel, hold the aluminum casing with a wrench so that it does not twist (this will keep the gage glass from breaking) and then unscrew the plug in the bottom of the gage.

The fuel strainer is on the lower left side of the firewall in the engine compartment. Fuel screens are located at each fuel tank line outlet, in the strainer and in the carburetor.

Oil System: Both the O-235 and the O-290 engines are wet sump types. Capacity for the O-235 (*Pacer* 115) is six quarts, capacity for the O-290 in the 125 and 135 is eight quarts.

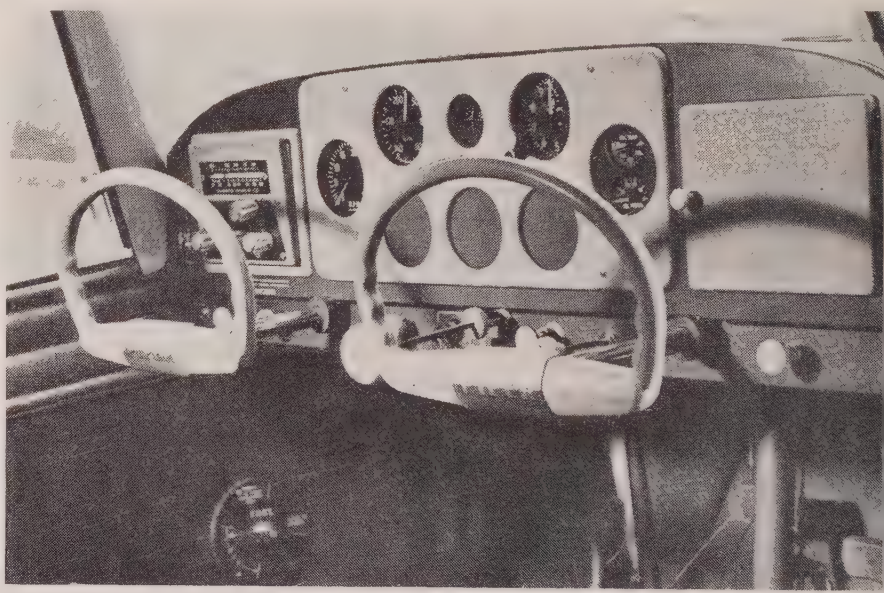
Brake System: Brakes are hydraulic expander-type and the oil reservoirs are in the master cylinders at the pilot control pedals. Dual brakes on all versions are optional equipment. The system should be serviced only with petroleum base fluid, preferably Univis No. 40 as that is original at the factory.

When the brakes are spongy or when it is otherwise necessary to refill the brake system, use standard procedures. For the dual brake set-up, remove the filler plugs on the right wheel brake master cylinders. (The cylinders are interconnected in the dual installation.) Remove the bleeder screw from the toe on the right-wheel brake unit and attach the line from a brake fluid-pressure unit. If an open filler can is used, hold it higher than the master cylinder to get gravity flow. Repeat procedure for left brake. When all master cylinders are full, replace filler plugs and bleeder screws.

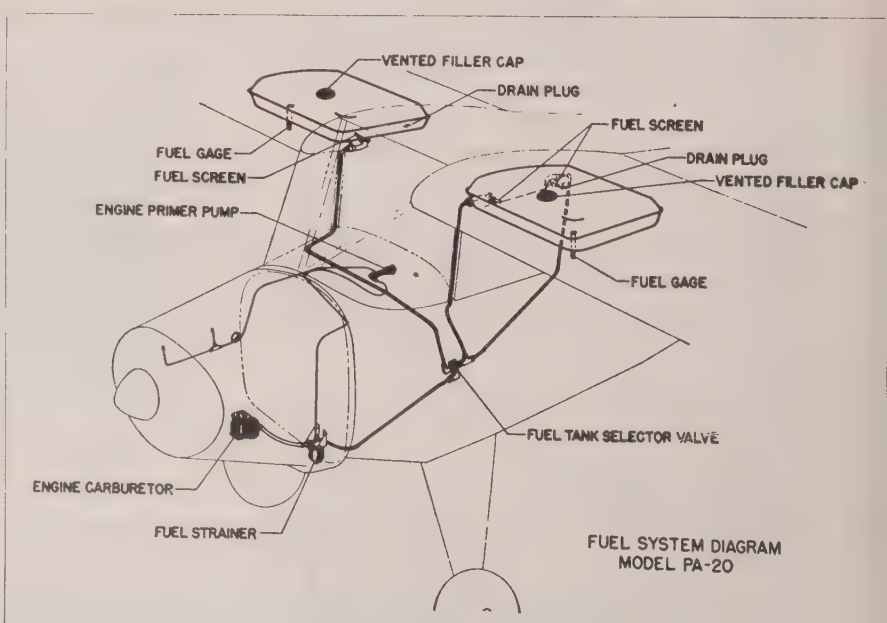
Tires: Main tires are 8:00 x 4 full balloo tires and should be kept inflated to 20 pounc for the *Pacer* 115, and 22 pounds for the 12 and 135. The tail tire is a solid rubber typ

Battery servicing: A 12-volt, 24-amper hour Reading S-24 battery is located unde the front seat on the right side. To servic the battery, remove the seat stop bolt an slide the seat full forward, lift the front edg and tilt it back. Do not fill the battery abov the baffle plate. It should be checked at leas every two weeks and distilled water added a required.

Shock Absorber: The PA-20 has a shoc absorber unit (Hydrasorb) for each righ and left gear. To repair or replace thes units, it is not necessary to remove the whol landing gear. The best method is to rais the airplane until the wheels do not touch Remove the bottom fairings around the uni Then tilt the front seat back, just as yo would do to service the battery, and remov the top bolts from the fuselage fitting an



FUEL SWITCH on the Piper *Pacer* is located on side of fuselage to the left of the pilo



DIAGRAMMATIC DRAWING shows the fuel system set-up on the new four-place Piper *Pace*

LANDING the Piper *Pacer* calls for the pilot to drop 40° flaps. Flaps are optional on Piper "115," standard on "125" and "135"

unit. The whole gear will then swing down and out so that the shock absorber unit can be repaired or replaced.

Windshield and Windows: Piper *Pacer* windshield and windows are made of Plexiglas, and care is required to keep them clean and clear. For cleaning your plane's windows or windshield, the manufacturer recommends the following procedure:

1. Flush windshield or windows with clean water and remove excess dirt, mud, etc., with your hand.

2. Wash gently with a mild soap and warm water, using a soft cloth or sponge. Be sure you do not rub; rubbing may scratch the Plexiglas and otherwise damage it.

3. To remove oil or grease or sealing compounds, wipe with a cloth soaked in kerosene. Don't under any circumstances use gasoline, alcohol, benzene, carbon tetrachloride, lacquer thinner or window-cleaning sprays.

4. After you have cleaned the windows or windshield, apply a thin coat of polishing wax and rub lightly with a soft dry cloth.

5. If you notice a severe scratch or mar, you can remove it by using jewelers rouge to rub out the scratch smooth on both sides, then apply wax.

Powerplant: Tips and Tolerances

Engine operation, ground check: When performing ground checks for engine and propeller efficiency and pre-flight, oil temperature should be at 120° F. minimum. Check magnetoes for drop at 1800 rpm, with 75 rpm maximum drop allowed. Carburetor heat application at full throttle should be approximately 100 rpm. With the carburetor heat off, the engine should idle at 550-600 rpm.

Static rpm propeller checks should be as follows: Lycoming O-290 with wood fixed pitch, 2200 to 2400 rpm; metal fixed-pitch, 2150 to 2450 rpm; Aeromatic, 2550 to 2600. Lycoming O-235-C1 with wood fixed-pitch prop. 2100 to 2350 rpm; metal fixed-pitch, 2150 to 2400 rpm.

Flight Controls: Travel and Adjustments

Ailerons: Travel is 15° up and down, plus or minus 2°. Stops are on the center hinge and on the control column. The stop at the aileron should be engaged first to allow full travel.

Flaps: Full travel is 40° down, plus or minus 2°. Flap should streamline in "up" position, adjust stop if necessary.

Stabilizer: Travel is 1° up and 6½° down. If play in the stabilizer yoke screw is excessive, the nut on the bottom of the screw pulley will take up the play.

Rudder: Full travel is 16° right and left, plus or minus 2°. Adjustments are made at the rudder stops.

Elevators: Full travel is 24° up and 12° down, plus or minus 2°, with adjustments made at the stops.

General Information

The master switch in the electrical system is under the front edge of the left front seat. In the down position it is "off" and when switched up it is "on." Fuses for the master switch are in the junction box under the left side of the front seat.

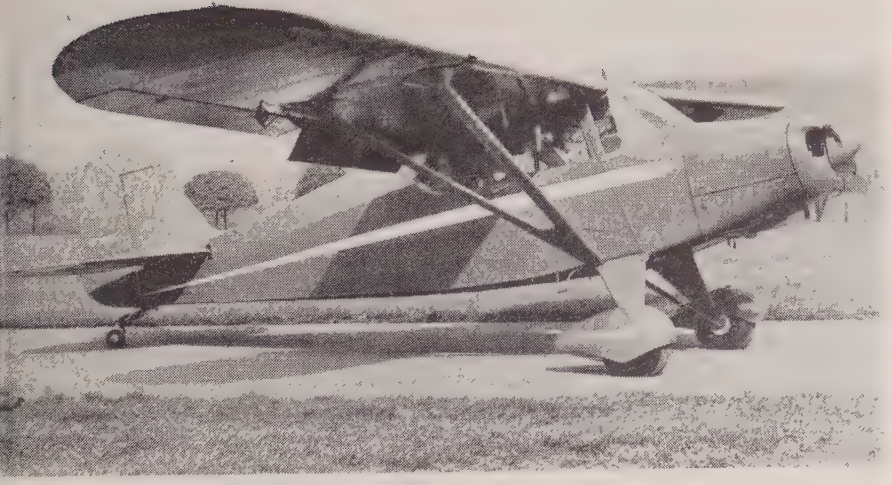
Generator, radio and light-system circuit breakers are on the left side of the cockpit under the instrument panel.

If whistling noises are heard from the vicinity of the tail section in flight, it may be due to the fact that the streamline tie rods bracing the stabilizer to the fin are not lined up properly with the air stream. Be careful not to scratch the tail wires, either with wrenches or pliers in making adjustments, as this may cause the wires to fracture when flight stresses are placed on them.

Check lists for 25-50 and 100 hour inspections for Piper aircraft can be obtained from the Piper Aircraft Corporation.

All maintenance other than routine should be done only by or under the direction of a licensed A & E, according to the CAR's.

Jerry Leichter



LANDING GEAR on the *Pacer* is the Piper Hydrasorb, consisting of left, right shock units

CAOA REPORT . .

CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. The CAOA headquarters are located at 444 Madison Avenue, New York 22, N. Y.

Third Annual Forum

Final plans are now fairly well set for the Forum at the Hotel Statler on Friday, May 19. A considerable proportion of the membership will be coming in on the afternoon of May 18 for the Annual Meeting of the Association, which starts at 4 p.m. This will be held in the Capital Room, and following the meeting a cocktail party and general bull session will get under way.

The Forum itself will be held in the larger Congressional Room, opening promptly at 10 a.m. A group of able and well-known speakers will address the morning session. These include Don Nyrop, Deputy Administrator of CAA; Brig. Gen. Herbert B. Thatcher of the Continental Air Command; Jerry Lederer, Director of Flight Safety Foundation; Melvin Nuss, secretary of the American Association of Airport Executives; and Rear Admiral John W. ("Black Jack") Reeves, Jr., USN (Ret.), in charge of the wartime NATS operation.

At the luncheon meeting, Chairman of the Board William B. Belden of Republic Steel will award a citation to Arthur Godfrey for his enthusiastic boosting of business flying during 1949. Godfrey has taken a *Navion* and *Twin Beech* in stride, and now will be operating a Douglas DC-3 for Arthur Godfrey Productions, Inc. We have no doubt that in his acceptance of the award, Mr. Godfrey will toss in—in his inimitable style—a few of his experiences in flying the executive airways.

A battery of top-level technical men has been lined up for the afternoon period. This session, which will consist of short talks, discussions, questions and answers of special interest to pilots, will open with a showing of CAA's new sound film "Airways in Transition," illustrating VOR (omni), DME (distance measuring), Off-course Computer, ASR & PAR (Airport Surveillance Radar and Precision Approach Radar, combining improved versions of the two functions of GCA) and ILS.

Representing the agencies will be Edwin L. White, chief of the Aviation Div., FCC; Joe Blatt of the Office of Federal Airways; and J. S. Anderson, V-P of Aeronautical Radio, Inc. These men know they will be on the spot for answers, but they plan to help CAOA get some of the remedial action needed.

Industry will be represented by Sperry (short talk on Zero Reader), Collins, Aircraft Radio Corp., Bendix, Lear, Narco, etc. Here's a chance to look over some of the newest stuff, right across the board.

New Members

During the past month the Directors of CAOA have accepted the applications of five companies for membership in the Association. We are glad to announce the details of their aviation operation, and to welcome them to membership.

Union Cutlery Company, Inc. This company is located in Olean, N. Y. and has been operating a Beechcraft D-18S since 1946. Mr. R. D. Brown is president and pilot, and the company pilot is Mr. H. F. White.

Thompson Products, Inc., Cleveland. This well-known manufacturer of automotive, aircraft and engine parts has been flying a Douglas DC-3 converted by AiResearch since last summer. Chief pilot is Mr. Robert E. Sheriff.

The Weatherhead Company, also of Cleveland, makes automotive parts and LPG cylinders and equipment. Chief pilot of the company's *Lodestar* 18 is Mr. Gordon Bennett, Mr. John D. Smetzer, Vice-President in charge of Industrial Relations will represent the company at CAOA meetings.

The Partlow Corporation of New Hartford, N. Y. (near Utica) manufactures industrial temperature controls. President and pilot of the company's *Twin Beech* is Mr. Howard W. Partlow, Jr., and the company pilot is Mr. Wayne A. McGrew.

Holley Carburetor Company, Detroit. This company manufactures automotive and aviation accessories, and operates a Beechcraft D-18S. Mr. John C. Holley, General Sales Manager is CAOA representative, and Mr. Orville E. Sparks the company pilot.

Passengers at Airport Gates

Owing to the prompt response of many CAOA pilots to the request for information relative to difficulties experienced in loading and discharging passengers at major-airport gates, Board Chairman William B. Belden of Republic Steel was able to include a strong punch on this subject in his address before the American Association of Airport Executives at Port Columbus on April 18. A copy of his talk will have been sent out to all members before this issue of SKYWAYS reaches you.

The original request from Headquarters was sparked by a letter from Chief Pilot Jack C. Jones of Fairbanks, Morse of Chicago, with an assist from Chief Pilot R. H. Peters, Eastern States Petroleum of Houston (a prospective member).

Pratt & Whitney Clinics

Many aviation department executives, pilots and mechanics of CAOA member companies attended the P & W Aircraft Operation and Maintenance Meetings held at Rentschler Airport, East Hartford on March 2, and at Southwest Airmotive Company's hangar at Love Field, Dallas, on March 22. These clinics have become an annual affair, and judging from what your Executive Secretary saw at the East Hartford show, they are very worthwhile.

At the SAC deal, some 200 attended, coming from 10 states and including executive-airplane owners, pilots and copilot-mechanics; personnel of the CAA, the airlines, the Air Force, Naval Air, and fixed-base operators.

Electronics & Aviation Safety

Under this key title the Radio Technical Commission for Aeronautics (RTCA) conducted a highly successful Assembly in Washington on March 30 and 31. It consisted of a down-to-earth progress report on the transition phase of the "Common System" of air navigation and traffic control—so called because it is a joint program of the departments of Defense and Commerce.

Even before the famous RTCA SC-31 report *Air Traffic Control* was published (February 1948), preliminary work on the 5-year transition phase was begun. This provides for an immediate standardization of presently available equipment, plus one or two items in the advance stages of development, and is expected to be completed in 1953. At that time the change-over from the old low-frequency four-course radio ranges will be made. Many of the improvements are now going into effect, supplementing but not supplanting the present system.

After discussion of the 19 points of the "Common System" by Mr. Charles F. Horne, Director of the Office of Federal Airways, CAA, a team of 12 engineers took over, and in a series of short talks, with slides, charts and diagrams, explained the functions and the present development status of each element of the Transition System.

These are: Very High Frequency Omni-Range (VOR); Distance Measuring Equipment (DME); Course Line Computer; Airport Surveillance Radar (ASR); Precision Approach Radar (PAR); Very High Frequency/Automatic Direction Finder (VHF/ADF); Instrument Landing (or better Low-approach) System (ILS); Transponder; Approach Timer and Private-Line; Mechanical Interlocks; and Airport Surface Detection Equipment.

On the second day, by means of a new CAA sound film these elements were shown integrated into a complete new system of airways. This was followed by a chronological account of a flight from "Airville" to "Sky Harbor" in which it was explained how each element of the system is used for navigation, communication, and traffic control within the various areas.

An indication of installation progress was then given. Eight improved Gilfillan GCA units are on the way, with Los Angeles and LaGuardia already commissioned, to be followed by Chicago, Cleveland, Washington, Atlanta, Boston, and NY Int'l. VOR will be countrywide by end of 1951, DME ground and airborne units are in procurement, and improved ILS sets are going in at many additional airports.

Advertisement

Bellanca NEWS REPORTER

"Builders of the world's most efficient airplanes since 1908" New Castle, Del.

IF IT'S PERFORMANCE YOU WANT LET'S LOOK AT THE RECORD!

A short time ago, a friend of mine explained to me that he was planning to write an article pointing up some of aviation's great names and airplanes. He asked me to let him have all the facts that I could dig up bearing on the Bellanca company's history. Here are some of the facts that I sent him—which should be of interest to all you fellows thinking about buying an airplane.

The first airplane that G. M. (Mr. Bellanca) built was in 1908. (See below). During World War 1, he taught the late Mayor La Guardia how to fly. But to get to the point—here is the log of Bellanca history. As you read it—you might bear in mind that his company has been under his management from the beginning (A record in any industry from the standpoint of continuous years of service). As I cite these facts to you—remember that G. M. is the man who created the new Cruisemaster and all of its forebears. Here's the official Bellanca record:

1907/1908—Built the WORLD'S FIRST tractor biplane. 1911/1912 BUILT 25 hp PARASOL MONOPLANE. 1912-1917 FLYING SCHOOL, BELMONT PARK, Mineola, L. I. N. Y. 1919—BUILT 45 hp 2 seater (102 mph/32 mph landing speed). 1921—BUILT 90 hp 5 SEATER (110 mph/38 mph landing speed).

1922—WON THIRTEEN FIRST PRIZES in National and International Contest.

1923—WON EFFICIENCY CONTEST, NATIONAL AIR RACES.

1925—WON EFFICIENCY CONTEST, NATIONAL AIR RACES.

1926—WON ALL EFFICIENCY CONTESTS, NATIONAL AIR RACES.

1927—FIRST WORLD'S NON-REFUELING ENDURANCE RECORD—51 Hours, 13 Minutes.

1927—WORLD'S LONG DISTANCE RECORD, NEW YORK TO GERMANY—3911 Miles.

1928—WON BOTH EFFICIENCY CONTESTS, NATIONAL AIR RACES.

1928—FIRST NON-STOP FLIGHT, NEW YORK TO HAVANA.

1928—AMERICAN ENDURANCE RECORD SAN DIEGO, 59 Hours, 7 Minutes.

1928—SOLO ENDURANCE RECORD, 35 hours, 25 minutes.

1929—FIRST NON-STOP FLIGHT, CANADA TO CUBA, 1404 miles, 12 hours, 56 minutes.

1929—SECOND TRANS-ATLANTIC FLIGHT, 3400 miles, 30 hours, 30 minutes.

1929—WON FIVE 1sts, three 2nds, two 3rds, two 4ths out of 7 EVENTS, entered at NATIONAL AIR RACES, including FIRST places in BOTH EFFICIENCY CONTESTS.

1929—WON CLEVELAND TO BUFFALO EFFICIENCY RACE.

1929—WON DETROIT NEWS EFFICIENCY TROPHY.

1929—WON FIRST AND SECOND PLACES among single engined planes—FORD RELIABILITY TOUR.

1930—ALTITUDE RECORD FOR COMMERCIAL PLANES, 30,453 feet. ALTITUDE RECORD FOR WOMAN, 27,418 feet.

1930—NON-STOP FLIGHT FROM NEW YORK TO BERMUDA and RETURN.

1930—WON BOTH EFFICIENCY CONTESTS NATIONAL AIR RACES.

1930—THIRD TRANS-ATLANTIC FLIGHT, HARBOR GRACE TO SCILLY, ENGLAND, 23 hours, 40 minutes.

1930—WON FIRST AND SECOND PLACE among single engined cabin planes in FORD RELIABILITY TOUR.

1931—WORLD'S NON-REFUELING RECORD, JACKSONVILLE, FLA., 84 hours, 33 minutes.

1931—FOURTH TRANS-ATLANTIC FLIGHT, Harbor Grace to Germany.

1931—FIFTH TRANS-ATLANTIC FLIGHT FLOYD BENNETT FIELD TO CARDIGAN, WALES, 3150 miles, 32 hours.

1931—SIXTH TRANS-ATLANTIC FLIGHT to establish WORLD'S LONG DISTANCE NON-STOP RECORD, BARREN ISLAND, N. Y. TO ISTANBUL, TURKEY, 5014 miles.

1931—FIRST NON-STOP FLIGHT ACROSS PACIFIC, SAMISHIRO BEACH, JAPAN TO WENATCHEE WASHINGTON, 4500 miles, 41 hours, 13 minutes.

1933—SEVENTH TRANS-ATLANTIC FLIGHT, NEW YORK TO POMERANIA, GERMANY.

1934—EIGHTH TRANS-ATLANTIC FLIGHT, NEW YORK TO LAHINCH, IRELAND.

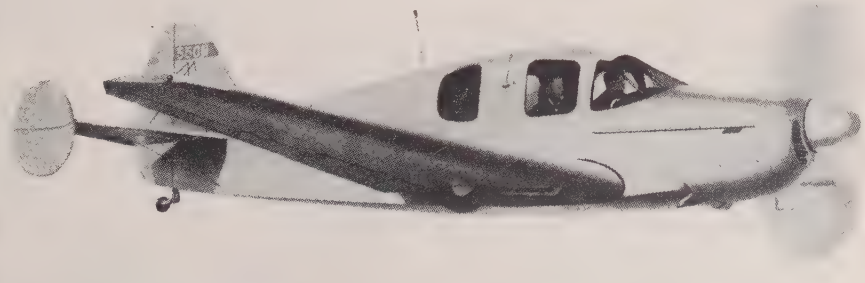
1934—NINTH TRANS-ATLANTIC FLIGHT, HARBOR GRACE, TO CAEN, FRANCE.

1934—NEW YORK TO NEWFOUNDLAND, ICELAND, ORKNEY ISLANDS, SCOTLAND, DUTCH EAST INDIES AND MANILA in commercial type BELLANCA SEAPLANE.

1936—ELEVENTH TRANS-ATLANTIC FLIGHT, ST. JOHNS TO CROYDEN AIRPORT, LONDON.

All of that is history, but, you say, what about Bellanca today? Well, here's the what about it. To begin with, the new Cruisemaster sells for $9,500.00 at the factory. It has a 190 hp Lycoming engine. It cruises at 180 mph from sea level up and lands at 40 mph. It has a range of nearly 700 miles. It comes equipped with VHF (you can have Omni-range, though it's extra). It has a hydraulically operated retractable landing gear. Hartzell Controllable propeller is standard. It is a bigger, real family sized, built-for-comfort 4 place job that has no equal for sheer beauty. The seats are of foam rubber and the upholstering is done in a Du Pont designed Nylon whipcord and leather combination. You can carry 80 pounds of baggage with all seats occupied plus a full load of gas. You can take this airplane in and out of just about any size field. As for economy, you and one passenger can fly in the Cruisemaster for less than you can in any two place airplane on the market. Well, how do you like that for $9,500.00? Compare all of this with well, any airplane. Place your order now, the line forms to the right!

Clarence D. Chamberlin,
Sales Promotion Manager.



Buy BELLANCA — it's the best buy — by far.

THE CRUISEMASTER $9,500.
F.A.F. New Castle

BELLANCA AIRCRAFT CORPORATION, NEW CASTLE, DELAWARE

C.A.P. News from Hq.

Air Rescue Service

Washington, D.C. Civil Air Patrol and Air Rescue Service joint training in rescue techniques will now be coordinated under the guidance of and monitored by ARS Flights. Those CAP Wings which have not previously participated in actual search missions will train with ARS activities in simulated training maneuvers. The ARS activity in whose area of responsibility the CAP unit falls will provide the coordinated training.

CAP's work during 1949 indicates the part its volunteer pilots are playing in assisting ARS in widespread rescue operations. Last year CAP pilots, operating in all 48 states, Hawaii and Puerto Rico, flew more than 8,455 hours at the request of the USAF and ARS. In California and Texas, where CAP was most active last year, 18 missions were flown with more than 3200 flying hours expended. Six CAP pilots in the U. S. lost their lives in the voluntary performance of search missions in 1949.

Sub Hunt Award

Mobile, Ala. Brig. Gen. A. W. Martenstein, C.O. of Brookley AFB, recently presented the Air Medal to Peter Sienko, of the Mobile CAP unit. The Air Medal was given for Mr. Sienko's work as an anti-sub patrol pilot over the Gulf in wartime. As a sub hunter, Pilot Sienko covered some 77,000 miles, averaging about 100 miles for each hour of flying. Although he did not see any enemy subs, Sienko did locate several lifeboats whose positions he reported to the Coast Guard, and rescues were made. Mr. Sienko is a native of Grand Rapids, Michigan, and has been flying since he was 16 years old. He obtained his private pilot's license in 1935, joined the CAP in 1942, and the Mobile unit in 1948.

Arctic Training

Anchorage, Alaska. Major M. B. Merrithew, staff officer of the Alaska Wing, CAP, recently completed training at the USAF school for "Survival" at the Parks AFB, Nome, Alaska. Purpose of the school is to teach pilots how to survive after a forced landing in the frozen Arctic wastes. Major Merrithew's experience and schooling will be used as a basis for training members of the Alaska Wing of the Civil Air Patrol.

Indiana Flood Relief

Gibson County, Ind. Unseasonable floods this spring provided Gibson's newly formed CAP unit an early and unique opportunity to get into action. The first assignment was to deliver mail to eight marooned families in the Gordon Hills community, at the request of Postmaster Lucius Alvis. Walter Morrison, local mail carrier, was flown to the foot of Gordon Hills by John Hull, of the Hull Brothers Airport, in a seaplane owned by the airport and loaned to the CAP. The mail carrier then borrowed an automobile, delivered the mail, returned to the seaplane and was flown back to his point of departure.

Headquarters Renovated

Charleston, West Va. The Charleston Squadron of the West Virginia CAP has just completed a remodel job on their headquarters in the Kanawha County Court House annex. CAP members have partitioned off the area into eight rooms: an office reception room, photographic room, auditorium, instrument flying room, radio room, snack bar, and rest room. Materials to do the job were purchased with squadron funds and member contributions. CAP members also did the actual work, which was completed in a month's time. The Charleston squadron lists 30 pilots among their 40 members, 10 planes and two Link Trainers. In addition to this equipment, two USAF ships (L-4 and L-5) are available for pilots of the organization. Classes are presently being conducted in radio, photography and instrument flying. Capt. Ross Taylor is the C.O. of the Charleston CAP.

New Squadron

Lancaster, Calif. Another Civil Air Patrol squadron has been organized in Antelope Valley. This new squadron is under the Ninth Group of San Bernardino, commanded by Major Howard McCook. Fifty-eight senior members, many of them former Air Force pilots and technicians, were enlisted at the first meeting. The squadron is based near the Air Force Flight Test Center at Edwards AFB, Muroc, California.

All-Gal Group

Madison, Wis. Twenty-five Wisconsin girl pilots recently organized their own unit of the CAP. This is thought to be the first all-women's group in the country. The unit numbers 32 women and is steadily growing. C.O. is Lt. D. M. Drews, who emphasizes that while the unit is open to women residents of Wisconsin or Upper Michigan, a pilot's license is needed to join the Flight.

Wyoming Wing Third

Cheyenne, Wyoming. In a recent report from National Headquarters, CAP, the Wyoming Wing was listed as third high in the number of missions flown. It was disclosed that the Wing had participated in nine missions during 1949 with a total of 137:35 hours flown. Two missions requested by Air Rescue Service totaled 56:30 hours; three missions requested by individuals totaled 10:45 hours; one mission requested by the U. S. Park Service totaled one hour, while Operation Snowdrop that was flown at the request of the USAF numbered 56:30 hours.

Shoulder Patch

New York, N. Y. New members of the Civil Air Patrol or the CAP Cadets may get their regulation shoulder patch free of charge by sending name and address to the Federal Supply Co., 135 Henry St., New York 2, N. Y., within 30 days after they join.

CAP CADETS of Westfield Squadron 222-3, New Jersey Wing 22, perform flight-line duties in servicing squadron's L-4. Cadets are T. Noone *(left)*, R. Morrison *(top)*, W. Lockhardt

I'm a Rainmaker

(*Continued from page 18*)

weather quite carefully. If you don't, you have some long walks home. As far back as 1928, I recognized the lenticular cloud condition that we now call the "Bishop Wave" in which so many glider altitude records have been broken recently. (*"The Big Wind Factory,"* SKYWAYS *July 1949.*)

We are now going into our third season of rain-making and the records kept by Cal-Electric prove that this type of seeding is more than profitable. For the past 40 years, the company has kept accurate records of the run-off from Bishop Creek and the surrounding areas where their other generators are located. The comparison figures were practically constant between the different areas until we started seeding. The 1948 Bishop Creek run-off was 14 per cent above expectations. In 1949 it was 12 per cent above the average.

In April the annual snow measurement is made along the entire Sierra crest by the State of California in cooperation with interested water and power firms. From this survey the water men estimate the annual run-off in the separate watersheds. They seldom miss this forecast by more than a couple of percentage points. The predicted run-off in Bishop Creek for 1948-49 was 52,000 acre feet. The actual run-off was 58,500 acre feet. We had developed 6500 acre feet of "bonus" water, enough to generate 14,300 kilowatt hours of power. At present rates, that much power is worth $56,000. After passing through the generators, this water would supply a city of 50,000 population with all its water for 15 days. Eventually, the water becomes the property of the City of Los Angeles for its domestic water supply—for free! Bishop Creek furnishes 29 per cent of the water Los Angeles gets through its aqueduct from Owens Valley.

A tenth of an inch of rain in these Bishop Cups will make enough electricity to supply 510 homes for a full year, and one flight may yield several times that amount.

Without getting too technical, here's the way this dry-ice seeding works. First, the dry ice must be chopped to the right size. If the cloud is not very thick and looks about ready to unload its water, we grind the ice fine. If it is very thick, we use a coarser grind so that the dry-ice pellets will fall all the way down into the depths of the cloud. Clouds averaging 3,000 feet thickness or less are seeded with dry ice the size of rice grains. Depending on the conditions, the larger clouds receive pieces about the size of an adult's thumb. We drop anywhere from 20 to 100 pounds of dry ice each trip.

Most people think that 32° Farenheit is the freezing point of water, but that isn't necessarily correct. In reality, 32°F is only the melting point of ice. When water freezes or changes to ice, it needs some foreign body to act as nuclei around which the droplets form.

Water droplets in clouds are generally too small to fall through the air and they can be cooled to quite low temperatures before they freeze because the air is fairly pure and has few nuclei. In fact, if there were no natural nuclei in the air, water droplets could be cooled to —39°F before they would suddenly change to ice crystals. If there were some natural nuclei in the air which were active at —20°F, then the water droplets would freeze when they reach that temperature.

Now for the "magic" action of dry ice! Dry ice has a temperature of—109°F and when it is dropped into a cloud, it cools the water droplets to their critical temperature and converts them to ice crystals.

Whenever it freezes, water gives off heat. This release of heat as the water droplets change to ice crystals stirs up the whole cloud and causes more mixing. With the balance of the cloud upset, the nearby water droplets tend to evaporate and freeze upon the already formed ice crystals. This makes them build up larger and larger until they are snowflakes. The reaction is not unlike the chain reaction of an atomic bomb, and soon the cloud begins to storm.

I've flown the P-38 back into clouds immediately after seeding and found the air perfectly smooth until I hit the exact spot where the dry ice was unloaded. Then, Oh Brother, is it rough!

It takes about 30 minutes to transform a seemingly peaceful cloud into a seething storm. The top of the cloud layer will be perfectly smooth until the dry ice is dropped. Then I usually climb up and watch the cloud mushroom up, sometimes as high as 4,000 feet above the regular cloud mass. Then the edges get all fuzzy and the cloud drops its moisture out the bottom of the cloud level. Once I dived from 30,000 feet to the airport in four and a half minutes so that I could watch the results of the seeding from the ground.

Original experiments in this type of seeding were begun in 1946 by Dr. Vincent J. Schaefer and Dr. Irving Langmuir of General Electric. When I first heard about this theory, I took a load of dry ice up in my little Cessna 140 and dumped it out. It snowed, but I couldn't depend on the results.

A couple of months later, Stuart Cundiff, engineer for the California Electric Power Company, asked me to continue this experimental program for them and see what happened. We kept the whole project a complete secret—partly because we didn't want to be laughed at if it wasn't a success and partly because we weren't sure of just what would happen if it were too much of a success.

When I first bought dry ice, I told the dealer that I was going to "shrink a bearing into place." Later I was going to "put up a quarter of beef for the winter." However, it wasn't long until the old-time residents of Bishop began to notice that it rained or snowed just about every time the airplane went up.

Then I'd tell them I was doing a little hush-hush experimental rain making over the 4,000-acre ranch that my brother William and I own at Adobe Meadows.

It wasn't long until the whole town of Bishop was sharing the secret. When there were tourists around, nobody would say a word, but when the old-timers were alone, one or two would slide up and say, "Bob, didn't you make it snow yesterday? I saw you take off and a half hour later it was snowing to beat the band."

Todd Watkins, publisher of the Bishop paper, held this story under wraps for over two years. When Cal-Electric finally released information of the project, he said, "You can look both ways up and down the valley and see white clouds hanging over the crest of the range, but no rain anywhere. Then look up over the Bishop Cups and you'll see the whole sky turn grey. In a few minutes it's snowing, sometimes all the way down to the valley floor."

My P-38 is actually an F-5G with a photo-nose. John McDonald usually flies up in the nose and dumps out the dry ice with an old coffee can. McDonald works nights in the local bakery and flies with me when it looks like good rain-making weather. We go up from five to eight times each month, depending upon conditions. Naturally, we keep complete records on the weather, wind and altitude plus the locations where we seed. I have a wire recorder in the cockpit that takes down everything that I say to McDonald over the intercom plus any notes that I want to make in flight. I send the transcript to the power company for their permanent record.

McDonald and I have had to do quite a bit of experimental work in high-altitude flying. We use electrically heated "bunny suits," heated gloves and boots. The ship has a pressure demand-type oxygen system

(*Continued on page 52*)

RAINMAKER Bob Symons' P-38 reaches for altitude over the High Sierras near Bishop, Calif.

Special Missions USAFE

(*Continued from page 27*)

seventeen-6787, long, lanky Charles E. Fitzwaters, a native of Buckhanno, West Virginia, and termed part "seagull" by his flying buddies, carefully let the huge *Flying Fortress* down a few hundred feet at a time as he began his approach to the field.

Behind him and seated comfortably in the plane's cabin, Eric Sevareid, noted news correspondent, and Major Reade Tilley, Public Information Officer for the United States Air Forces in Europe, were nonchalantly engaged in a game of gin rummy. They were watched by a half dozen members of the State Department who were due in Paris for the United Nations Conference that very day.

"Pilot says fog," Tilley yawned.

"You owe me four dollars," Sevareid reminded him. The game continued.

On the ground the GCA man and his crew watched the plane, a tiny speck on the radar scope, as they guided it in the final phase of its approach.

"You're on the glide path," the operator whispered into the mike. "You're 50 feet too high—you're 3° too far to the left—you're on the glide path—you're a quarter of a mile from touch down. Increase your rate of descent. You're over the landing strip—you're 50 feet off the ground, you're . . ."

Suddenly the pilot's voice boomed, "Hey, GCA, we're on the ground. As a matter of fact, I'm just coming to the end of my roll."

"Yeah?"

"Yeah!"

"Well, baker seventeen-6787, suppose you find your way in this fog to the terminal. Over and out!"

Fifteen minutes later, when ground personnel had finally succeeded in guiding the plane, step by step, through the fog and over the wet taxi strip, a somewhat relieved but bewildered Operations Officer watched the unruffled and unconcerned passengers unload.

"What outfit are you from anyway?" he said to the pilot, "in all this weather you'd think . . ."

"We're from Special Missions out of Wiesbaden, Germany," Fitzwaters told him.

"I might of known," groaned the 'Ops', "they'll do it every time."

The Special Missions Squadron of the United States Air Forces in Europe might be a small organization, but it has one of the most important and dramatic missions ever assigned to a flying group.

Briefly, their job is to transport personnel to a specific place at a certain time and, if need be, return them to the place they started from. This may include VIP's, the military's term for very important people; an injured airman or soldier whose life depends on arriving at one of the larger hospitals where proper medical attendance can be secured in time; flying member of the Senate and House of Representatives on inspection trips; spraying a plague-infested city with DDT or even rushing medical or food supplies to infected or isolated cities.

The squadron is under the command of the same gentleman who landed the plane in the Paris fog, Captain Charles E. Fitzwaters. His roster of officers and airmen number 130 and represent practically all of the 48 states. The squadron is entirely self-sufficient. Only the Air Forces' flying and technical "best" are eligible for assignment to the organization. Personnel are noted for being "extra sharp" and equally as closed mouthed. They often know the news long before it happens. So far, a news leak has never been chalked up to the squadron despite the efforts of many to get them to talk.

Their ports of call include practically every important city in Europe—including Moscow. Their list of passengers range from the Secretary of State Dean Acheson to such Hollywood celebrities as Irving Berlin, Bob Hope, and Jeanette MacDonald. One of their regular customers was General Lucius D. Clay, former Military Governor of Occupied Germany. A good customer these days is High Commissioner John J. McCloy, successor to General Clay.

The Special Missions Squadron's safety record is enough to gain the envy of the president of any commercial airline corporation. During the year 1949 they flew 1,332,360 air miles. That is approximately 12 million passenger miles. Not only have they never scratched a passenger nor cancelled a flight, but they have never had an accident. So far as can be determined, no one has even been subjected to the unpleasantness of a sudden or abrupt stop.

Each of the pilots possess a green instrument card which means he is qualified to fly in practically any weather.

Lined up at the hangar on the Wiesbaden Air Base are C-54's, the good old dependable workhorse of the Air Forces, the C-47's, and above all, the favorites of the Squadron, the B-17's. Nobody knows why these combat veterans prefer the *Flying Fortresses*. Other planes are just as dependable and faster but the pilots seem to cling to them for sentimental reasons. Perhaps they recall the bombing runs over Germany and how the B-17's, half torn away from flak, limped back to their bases in England.

Pet among the aircraft is the B-17 "Cannonball". It is the ship used most frequently by two-fisted, likeable Lt. General John K. Cannon, Commanding General of the Air Forces in Europe.

The crew chief of the plane, Master Sergeant Gene Short, who has idolized General Cannon ever since the day the General begged a cup of coffee from the crew and, lacking a spoon, stirred it with a greasy screw driver, has been with the ship since it was 115 hours old.

"That's just about the number of hours it took to deliver the plane from the factory," Short says.

"I've been with this baby in and out of storms, lightning and thunder included. When the General comes aboard, he just relaxes in the seat by the waist window and says, 'let's go'. After that he is just like one of the crew."

(*Continued on page 47*)

HILLER 'COPTERS

Two new Hiller helicopters have been announced for 1950: the Executive Hiller (*above*) and the Utility (*right*). The Executive is powered by 182-hp Franklin and features special instrument grouping, radio, cabin heater, defroster, etc. The Utility 360 is powered by 182-hp Franklin, is equipped with convertible cabin and door enclosures. It carries useful load of almost 1,000 pounds. It is approved for three passengers, can be used as crop sprayer and duster, air ambulance, or as amphibious ship.

HILLER 360 Executive *(above)* is approved for night operations, and features standard equipment essential to good passenger operations. The Utility 360, however, features convertible cabin so that the helicopter is a real "working" ship

Night Watch of the Air Force

(*Continued from page 14*)

itting the windshield and getting a solid crack on the noggin. These two-piece ailerons are the sweetest system to slow down high-speed airplane that I've ever seen. There is no change of im. When I pull back on the de-celeron lever that is mounted side the throttle, the ship practically stops in the air. The ndle is similar to a throttle—you push forward to close the -celerons and pick up speed; and pull back to pop open the -celerons and slow down.

This rapid deceleration is important on fast fighters because ey close-in on a target in a matter of split seconds. Actually, e pilot of a Piper *Cub* flying 4,000 feet below a high-speed hter is practically immune to damage because the fighter can't w down and turn fast enough to get a shot at him. Any rasshopper" pilot of the last war will tell tall but true tales *Cub* pilots who kept out of trouble with their two-mile-a-nute ships because they were such a fleeting target for a rsuit plane.

This big Northrop ship has been designed as an all-weather terceptor. That means that it must be stable at slow instrument-proach speeds. The wing is short and straight, but because of e heavy loads involved, the ship flies a lot like a sweptback hter. You don't have to haul back as far on the stick on take-off in a ship with sweep-back, but the nose comes up a couple feet before the ship lifts into the air at normal take-off speeds.

In flight the ship handles beautifully—just like a big baby-ggy. Rate of roll is extremely fast, and it practically beats you er the head before it stalls. All the controls are actuated by a ll-power system, and we've built an artificial "feel" into them th springs and a force-producing bellows. Both rudder and erons have a bungee system of centering springs that tighten more and more as the controls near their top limits. Because the high speeds we can hit, the elevators are hitched up with bellows affair that becomes increasingly stiff as airspeed in-eases. The full-power system has an emergency electric system ached to the servo units just in case there should be a failure the main system. The gear will come down of its own weight th the help of bungees if the hydraulic system goes bad.

Actually, aileron control with the de-celerons open is still just out perfect. Add flaps along the full inside half of the wing, d landing speeds are bound to be comparatively slow. The erons droop when the flaps are down so there's an effective ll-span flap to aid in slow instrument approaches.

The F-89 is a fast airplane—just how fast I'm not allowed to . However, it will go above 40,000 feet and is in the "600-mph nge." The chase planes that follow all experimental models Edwards Air Force Base at Muroc Dry Lake have a little uble in keeping up with this big bruiser—in spite of the fact at it is two place and is designed to pack a truckload of radar d blind-flight equipment. I've been up on flights where I lost chase plane in 10 minutes and never saw him again until I s on the ground.

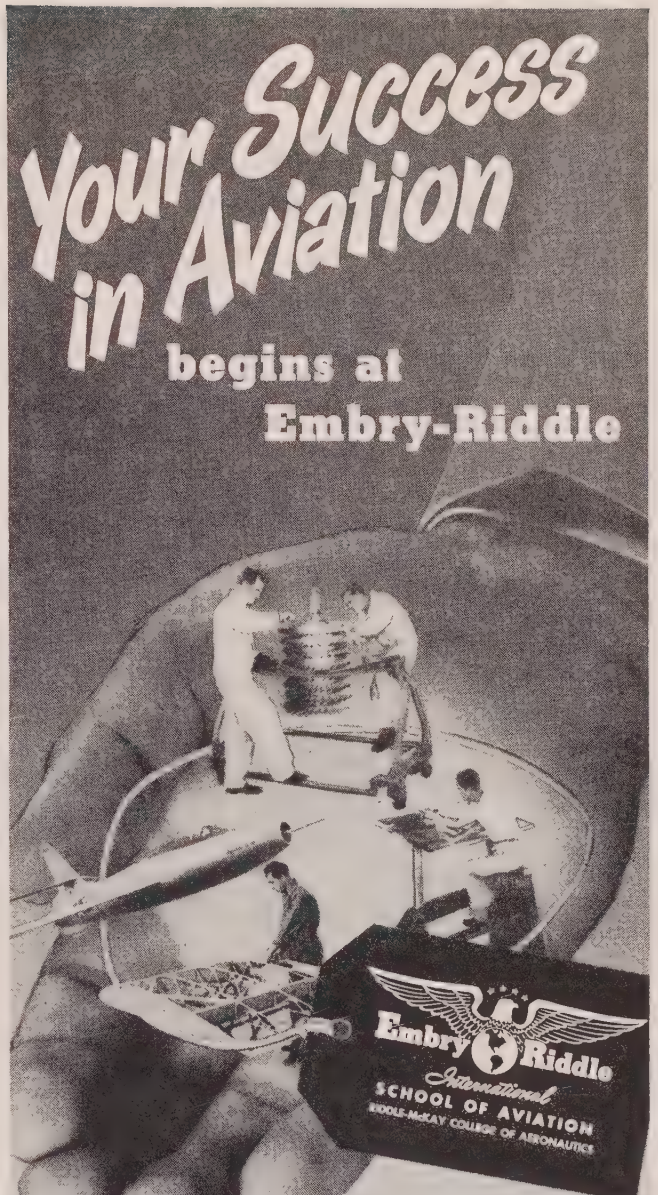
In any test flying, you go up after information. We use pressure k-ups, thermocouples, strain gages and photo recorders to ob-n this data. Once we used tufts of twine to try to find the st spot for a stall-warning pick up. Most of the tufts blew off, enough of them stuck to the ship so that we could figure out ere to put the vane for the stall-warning device. This ship has h a good natural stall warning with tail buffeting that I never rry about stalling. Even in accelerated (high-speed) stalls, re is a marked shudder before the ship pays off.

Project engineer on this ship, W. R. Clay, keeps crying his s out every time they add something else to that jam-packed se section. There's enough confidential radar equipment up re to load a truck—and then someone wants to add something re. Naturally, anything forward of the cockpit is secret, but e ship is somewhat similar to the older *Black Widow*. The 89 is only slightly smaller than the *Black Widow*, but it weighs good deal more. The *Widow* had a full radar search unit in e nose to track down enemy "bandits."

One night in 1945, Major Carroll Smith was flying his *Black idow* "Time's A-Wastin'" at Mindoro in the Philippines. Be-e coming home for breakfast, he knocked down four Japanese nes that tried to hide in the clouds.

The F-89 is designed to do the same job as the *Black Widow*—

(*Continued on page 46*)



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TRAIN IN MIAMI--AIR CAPITAL OF THE WORLD

Night Watch

(*Continued from page 45*)

only at faster speeds and under more difficult conditions. All-weather interceptors—like night fighters—have to overcome handicaps that ordinary fighter planes do not encounter. First of all they have to lug around some very heavy search equipment. This weight is added to the normal armament that any fighter has to carry. As interceptors, they necessarily are based at the outer perimeters of defense. These areas often have poor or below-average landing strips that have been hacked out of the terrain. Add to that the necessity for landing at night or under poor visibility conditions. Ordinary fighters would find these landings tough, but they are tougher still for all-weather planes because of the added weight. This landing handicap means they have to land at slow speeds.

The *Black Widow* was able to overcome this handicap with its maximum span flaps, made possible by retractable ailerons or "spoilers." "Spoilers" couldn't be used on the *Scorpion* because the wings were too thin. Instead, Northrop designed the "decelerons"—made the ailerons work as flaps, too.

Since the *Scorpion* has to face all kinds of weather—particularly the cold variety—quite a bit of thought has been given to de-icing. Heat is piped from the engines through ducts to the hollow leading edges of the wings and tail surfaces. The windshield is heated electrically to keep it from icing up. The de-icing system has an override switch to keep from damaging the airplane on the ground just in case the pilot should forget to shut off the system.

This all-weather interceptor has two J-35 jet engines and will operate surprisingly well on one engine. We have housed the engines partially within the fuselage to cut down on frontal area and increase performance. An added advantage of this close-in engine placing shows up when one engine is cut off in flight. There is almost no change in trim and the ship does not yaw at all as it would if the engines were mounted outboard on the wings.

Naturally, the ship has a pressurized cabin and ejection seats. The seat-ejection system is standardized on all fighter aircraft so far as the actual levers to pull are concerned. Each manufacturer does his own internal construction, but to get out of the airplane, the pilot merely pulls up on two arm-rest handles at the bottom of the seat and pulls his feet off the rudder pedals into the seat stirrups. When the handles are all the way up, the canopy blows off and he presses the triggers on the handles which makes the seat go.

The factory sent me back to Wright-Patterson Air Force Base to take special training in the use of ejection seats before I made my first flight in this ship. I learned more about these bail-out seats from our own Northrop engineers. We have a special crew that has done much of the development work on these seats and, while the opportunity has never presented itself, I wouldn't worry at all about blowing myself out of a high-speed plane with one of these seats.

A similar system is located in the rear cockpit for the radar operator. Performance has been upped with the tandem seating arrangement by cutting down on the frontal area of the fuselage that would be required for side-by-side seating—and the radar man in the back seat does all his seeing from the radar screen anyhow.

You can't slide into that front cockpit without realizing the designers devoted a lot of thought and experience to the arrangement. Each inch of space is used to advantage. Despite the fact the cockpit is jam-packed with equipment, there is plenty of room for a big pilot. I'm six feet tall and weigh 200 pounds, but I find the cockpit arrangement comfortable. On the test work I've done to date, I have not used a G suit, but I do carry a Lombard helmet to keep from getting knots on my head in turbulent air. The ship is quite warm at altitude, and the air-conditioning system will spray snow all over you once in a while.

With the pressurized cabin, there are no noticeable ill effects from a fast let-down. I've come down from over 35,000 feet in the XF-89 in less time than it takes to boil an egg. From the cockpit, you're not looking at much but straight down on a run like that. I pop the decelerons wide open, come back on the power and let the ship head for home. There's no sensation quite like it, except possibly riding an Empire State building elevator out in the open. That's quite a drop in this big airplane that measures roughly 50 feet of wing by 50 feet of fuselage. There's several thousand pounds of unmentionable air freight in the nose and when you get tip tanks aboard, you're over the 30,000 pound mark.

After two years at the University of Cincinnati, I went into the Air Force. After flying school, I wound up at Wright-Patterson Air Force Base in the test section—flying P-40's, P-51's and B-29's for four years.

After leaving the service, I came to Northrop and asked for a job testing *Flying Wing*. because I'd heard scuttlebutt that they were the most advanced airplanes to be turned out since the Wright Brothers. On "the Wing" program I flew with Max Stanley, Northrop's senior test pilot on the B-35 and YB-49. The XF-89, however, has been my baby all along.

The design staff has done a grand job on this airplane. They have stayed with simple design that is easy to mass produce and simple to maintain in far-from-home fields. The thick skin of the wing not only takes the extreme stresses of high speed and high weight, but it also carries the heat of the thermal de-icers.

The swept-up tail, which puts the stabilizer high above the wing wake in flight, gives the ship the appearance of a king-sized black scorpion. That's where the name came from.

There is no extra rigging to install in this plane. With this heavy skin construction, there isn't any such thing as a part "almost" fitting. Either it fits cleanly or you throw it out and make another. Thin skin and small riveted parts are cheaper to build but aren't practical on such a high-performance ship. In the long run I believe that we will have fewer rejected parts because of the absolute precision required. In the man who machines it knows that it has to fit right the first time, he'll be a lot more careful than one who has only a rough fit to make.

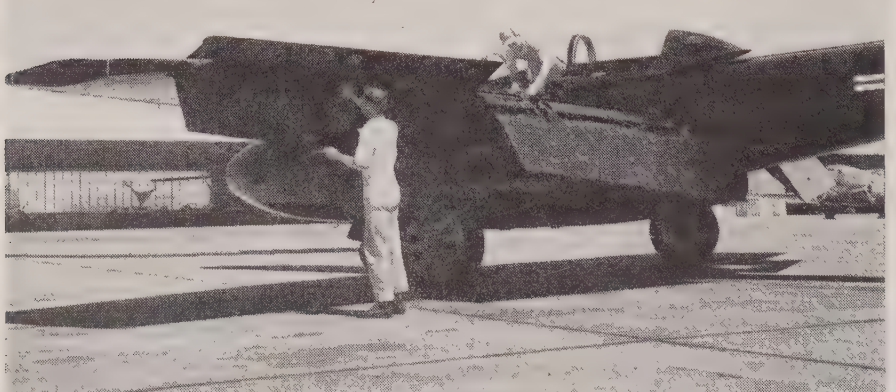
The landing gear on the F-89 is a honey. You can't seem to make a bad landing with the ship. We use high-pressure tires, pumped up to nearly 200 pounds. The tires are small—they've got to be to fit into that thin airfoil section, but we have a dual nose wheel. With the full high-pressure hydraulic system on this ship, the gear will come up in only four seconds. That gives the pilot an extra margin of safety on take-off. Because of the thin wing, the single over-sized landing light is built into the nose of the ship. That saves room for other things in the wing. The ship also has a taxi light on the nose-wheel strut. The high-pressure tires are very large in diameter and look as though they might have come off a 1916 automobile, but they must be that thin to fold up into that wafer thin wing.

For experimental work, we have used RATO bottles on take-off. I usually "pull the string" on the RATO's at about mid-point of my take-off run, and then hit the gear switch just as soon as the ship wants to stay in the air.

Personally, I like that stubby straight wing for take-off and landing characteristics. Even with the tip tanks on, the ship handles beautifully. Actually, the tip tanks are mounted at the center of the wing chord and add to the aspect ratio of the wings. Aside from the weight, you'd never know they were aboard.

After having lived with this ship for a year, I was probably the least surprised man at Northrop when we were awarded a contract for a production model. The ship is big and tough. That's what the Air Force ordered—and that's what they're getting.

I'd hate to be chased by this baby—night or day!



DECELERONS on the XF-89 combine the functions of ailerons, brakes and landing flaps

Special Missions USAFE

(*Continued from page 44*)

Best known and probably least publicized flight of the Special Missions Squadron is the irregularly scheduled trip into Moscow, Russia, to pick up or deliver members of the American Embassy. It is the only flight involving American aircraft permitted by the Russians.

Only members of the crew and specially documented passengers, Embassy members, are permitted to make the Moscow flight. This is not a U. S. but rather a Russian restriction. In order to make the trip, members of the crew must submit an application for a visa to the Russian authorities at least a month or six weeks in advance.

Once the flight is approved by Russian flight control authorities, the plane leaves Wiesbaden, Germany, and is boarded at Tempelhof Air Base, near Berlin, by a Russian navigator and radio operator. These two are unable to speak or understand English, so they give directions by sign language.

As soon as the plane lands at Mochea Airport in Moscow, Russian police and custom officials board the plane. Their first act is to request all papers, magazines and books on board. These are placed in custody under lock and key until the plane is ready to return to Germany. American airmen have no opportunity to inspect Russian combat planes on these trips. All the aircraft in evidence at Mochea are commercial planes, and of seemingly good quality.

Shortly after their arrival, they are whisked away to the American Embassy and are then free to go shopping or sightseeing around Moscow. They need never feel lonesome, however, for the Russians thoughtfully provide company on these excursions. There is a little difficulty in sightseeing and shopping, however—the people do not talk to them, for one reason or another the Russians are not a very talkative people.

Shoes are expensive in Moscow and passersby on the street gaze with envy at the American's shoes. A pair in the Russian shops cost about 560 Ruples. Translated at the diplomatic rate, afforded to members of the various Embassies, it means the shoes would cost Americans $68.50.

When the American crew is ready to return to Germany, the Russian authorities are notified and they in turn provide the officials needed to release the guard around the sealed plane. The books, magazines, and papers are returned, the familiar navigator and radio operator put in an appearance, and the plane is off.

One factor always impresses American crewmen. The Russian authorities take extreme caution to see that nothing happens to the American plane while it is on Russian soil. To date, no one has ever detected the slightest indication of molested equipment or sabotage.

Flying in Europe is not always as pleasant as it may sound. The towering Alps caution even the most "cocky" of pilots. There is the complicated language problem, and familiar to most flyers are the terrible fogs that move in from the English Channel and seem to hover for days over the European continent. None of these stop the Special Missions Squadron, however, when there is a job to do today—not tomorrow.

What may be expected next of the Missions outfit is best pointed out by an accident that occurred last summer on the German autobahn, Germany's famous super highway.

A corporal from the United States Constabulary rounded one of the curves in his automobile a little too fast, lost control of his vehicle and crashed into the piling on the side of the road. He was injured internally and had to be rushed immediataely to a hospital in Munich.

A call to the Special Missions Squadron brought word that one of the single-engine planes, an L-5, would be there in half an hour. Exactly 22 minutes later, the pilot brought the plane down on the paved highway beside the wreckage.

He helped place the patient in the plane and then, turning to the Medical Corpsman, stated that no one need come along to take care of the injured soldier.

"You see," he explained, "we are trained in first aid. We will be in Munich in a short time anyway."

"What won't your outfit think of next," the Medic replied, "the first thing we know you'll be flying up to the North Pole."

"We are working on that now," the grinning pilot shouted as he gunned his engine and took off into the air.

The pilots of the Special Missions Squadron, whether they are at the controls of a C-54 or a tiny I-5, take a great deal of pride in their record of safety . . . and justifiably so. After all that record hasn't been a matter of luck . . . they worked for it.

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Pilot Report . . . D H Beaver

(*Continued from page 22*)

seat is permanently fixed and extremely comfortable.

This is strictly a one-pilot airplane. While there are rubber pedals on the right side and the control wheel is of the throw-over type, everything is designed for the pilot in the left seat. Engine and propeller controls are mounted high in the center of the instrument panel and at first feel a little uncomfortable. However, as soon as you fly the ship for an hour or so, it becomes second nature to reach up and forward for the throttle, propeller pitch and mixture controls. Carburetor heat, wobble pump and fire-wall shut-off handles are located at the bottom of the instrument console. This ship has a built-in CO-2 fire extinguisher under the hood.

Radio equipment is within easy reach at the right side of the instrument panel and all flight gages are installed directly in front of the pilot where they belong. Engine instruments: tachometer, manifold pressure gage, fuel and oil temperature and pressure, cylinder head and carburetor temperature gages, are all located in the center of the console within easy vision of the pilot.

The ship has an electric inertia starter with an emergency hand crank that can be reached by anyone standing on a float beside the ship. Typical of the design of this ship is this little item where the pilot can start the ship alone with a hand crank by winding the flywheel, opening the door to the pilot's seat and pulling the engaging lever. He can reach all the engine controls at the same time. The whole airplane is designed for one-man operation.

We cranked the left-hand seat clear back to the end of its adjustable stops, snapped on the electric inertia starter and fired up the engine. As in any radial-engined job, forward visibility on the ground is partially restricted, but you can see so close to straight ahead over the nose that it makes little difference.

We taxied down to the warm-up circle at Glendale, ran a power check and then called the tower for take-off clearance. Speed Nolta made the first take-off. He used slightly less than full throttle, socked forward on the control wheel to pick the big tail up off the ground, and we were in the air as soon as he started back on the wheel. Full-load take-off roll at sea level is less than 550 feet with the recommended 30° of flaps.

Rate of climb is just about out of this world. The ship climbs with 10° flaps at over 1200 fpm at 80 to 85 mph Indicated. We climbed out over the smog layer and headed toward the desert at 8,000 feet. Our first stop was Death Valley.

In level flight, the *Beaver* makes friends in a hurry. The ship is perfectly stable in the rolling air currents always found at midday over the desert. The trim-tab is located on the top of the cabin and looks like two miniature model race-car rubber tires mounted side by side. We asked why the trim wasn't located between the seats and Nolta explained that the cabin-roof installation was simpler and lighter to construct because the cables can run directly back along the top of the fuselage to the tail.

As soon as proper trim is established, the ship flies wonderfully hands-off. It has a solid feeling much like a DC-3 and it's 4650-pound weight steam-rollers the light bumps. Ballbearing controls contribute materially to this smooth control touch.

BEAVER gets off the strip at Arcularius, 7100 feet above sea level, like a jack rabbit

At 8,000 feet we were pulling 28 inches of manifold pressure at 1850 rpm and our true airspeed was between 140 and 145 mph. While little weight has been spent in soundproofing, the cabin is not noticeably noisy. Rubber engine mounts dampen vibration satisfactorily. In smooth air the *Beaver* is like a well-worn, comfortable rocking chair.

We passed over the desolate Panamint range, circled down over Bad Water—the lowest spot (278 feet below sea level) in the country—and flew in over Furnace Creek, 178 feet below sea level.

There isn't much more to landing the *Beaver* than in putting down a *Cub*. The mixture control goes from auto-lean to full-rich. The propeller goes forward to 2,000 rpm and then you start pumping down flaps with the little hydraulic hand pump located between the pilots' seats. The flaps will drop 45° and the ship becomes increasingly nose-heavy as the flaps go down. The flaps are slotted and act somewhat similar to the Fowler flap on the old Lockheeds. As you drop more flaps, they tend to travel rearward and add to the area of the wing because the hinge point is located nearly a foot below the bottom of the airfoil. In addition, the ailerons droop 15° when the flaps are lowered.

Approach speed is roughly 80 mph with an actual touch-down, power off and full flaps, at an indicated 42 mph. That's not bad at all for a heavy airplane of this size.

The toe brakes are very efficient and the ship shows no tendency to go anywhere but straight ahead on a landing roll-out. The tail-wheel is a self-centering unit similar to the old Stearman that takes a blast of throttle and brake to unswivel.

Since cold-weather operation is rough on conventional landing-gear struts, the *Beaver* uses a series of rubber blocks to act as shock-absorbers. These blocks may be adjusted as they settle with age so there is almost no wear. The ship uses external Goodyear hydraulic brakes similar to F-51.

Parked at the Furnace Creek Airport beside an old two-place Interstate *Cadet*, the *Beaver* began to look like a big airplane. The ship sits high off the ground so that landing in low brush will not give trouble. The wings are long and thin and much of the plane's inherent stability and high performance comes from the high aspect ratio of the wing.

After lunch, we started north toward Bishop. There is noticeable torque on take-off. With power applied quickly, it takes quite a bit of right rudder for the first few seconds to hold the ship straight ahead, but there is plenty of rudder remaining.

We headed northwest out over the barren ridges surrounding Death Valley. Our climb from below sea level to 9,000 feet took less than 10 minutes. Over the Saline Valley, an extremely desolate dry lake midway between Furnace Creek and Bishop, we sighted an airplane on the ground. For a short while it appeared that we would be in on the rescue of a downed plane crew, but closer examination showed the ship to be what was left of a B-24 that had crash-landed on this dry lake in 1944.

We landed at Bishop to find out if any of the high-altitude fields were fairly free of snow so that we could check the thin-air performance of the *Beaver*. The really high fields like Tunnel Meadows—2100 feet long at 9100 feet above sea level—were under many feet of snow, but both Arcularius Ranch and the Long Valley strip, at 7100-foot elevation, were soft but passable.

Our first dirt-strip landing was at Arcularius. This narrow strip is 5800 feet long, but on a previous flight in a tired surplus PT-19, we had rolled nearly the whole length of this field before breaking ground.

"Let's see how short you can land this ship," said Nolta as we circled Arcularius.

We turned on a long base leg, pumped down full flaps and turned on our final approach indicating 70 mph. With full flaps, the forward visibility is excellent because the engine is far below the regular line of flight. We slowed to 60 mph and came across the end of the strip. The ship decelerated quickly and we touched slightly tail-wheel first with the control column all the way back.

"Now hit the brakes hard," said Nolta.

We climbed on the brakes hard enough to skid the tires in the soft dirt and the *Beaver* came to an abrupt halt. There was no tendency for the tail to come up off the ground even though the brakes were skidding.

"If the field is really short, you can land this airplane with the brakes fully locked and never worry about it," said Nolta.

We climbed out to shoot a couple of pictures while Nolta demonstrated the short-field take-off performance of the *Beaver*. He locked the brakes, ran up to full throttle and then let go of the brakes. You could see the rudder deflect all the way to the right to take care of torque, but the plane stayed down the center of the narrow runway. The take-off roll was substantially under 800 feet. From the ground you could see the tail come down until the tail wheel hit the ground and then the main gear would come free and the full-throttled engine would walk the big airplane right up into the air.

"The *Beaver* will land and fly back out of any field that any other conventional airplane will use," said Nolta.

This quick up-and-at-'em performance can be fully appreciated only after you have struggled off the same strip in an underpowered airplane and then floundered out through the sagebrush for five miles before having altitude enough to make a turn.

With Nolta flying, we hopped over the ridge and shot a couple of landings at the Long Valley strip adjoining the main highway to Mammouth Lakes. Nolta dropped full flaps and made a 45° diving turn into the field with an airspeed of 50 mph Indicated. Even in the back seat, there is only a slight burble from the flaps.

On the way back to Bishop, Nolta showed the slow-flight characteristics of the *Beaver* with power on and flaps down. By hanging the ship on the propeller, he was able to drop the airspeed below the 30-mph mark and still make a controlled turn. With a power-off, full-flap approach, the glide stabilized out at 50 mph with a 500-fpm rate of sink. With power off and the wheel held all the way back, the ship merely mushes with a slight nose oscillation.

We returned to Bishop and tied the ship down for the night. Tie-down rings are installed at the outboard strut point and red-painted external locks keep the controls from whipping in the wind.

Many of the fine points of the *Beaver* show up on the ground. The three gas tanks, for instance, are located under the cabin floor. The tanks total 87 U.S. gallons and are all filled from a covered recess beside the left-wing strut. There is no climbing up on top of the wing in icy weather to refuel the *Beaver*. Oil is added from inside the cabin—and that's a decided asset for cold-weather operation where a pilot can add a couple of quarts of pre-heated oil, start his engine and then add the remainder of his lubricant.

For easy loading, here's a neat little gimmick. All the doors can be removed by merely opening them and pulling up. The hinges are merely pins with loops on the door itself. The ship is constructed with enough weight so that the doors can be slammed shut just like the Fisher body of a Cadillac.

The floor of the *Beaver* is flush with the doors to aid in loading and unloading. Eight tie-down rings are fitted into the floor and the whole unit is stressed for 250 pounds per square foot. Gross capacity of the cabin, deducting space occupied by the pilot, is 125 cubic feet and there is an emergency locker for a "bush kit" of emergency rations fitted aft of the cabin wall. If that isn't enough, you can carry a 16-foot canoe on one of the floats!

Reports say that the *Beaver* is at its best as a seaplane. Float fittings are standard equipment and the control cable for steering water rudders was even installed in the cabin of N93299.

The ship is just about ideal for Forest Service and Coast Guard air-sea rescue work. Oil-field operators find it a good freighter to ferry rush spare parts. Well-to-do sportsmen could stand the *Beaver's* $26,450 price to reach fabled fishing spots. In any part of the world where transportation is poor, the *Beaver's* good cruising speed would pay off.

One of the biggest boosters of the *Beaver* is Arctic lecturer Father Hubbard who flew with Charlie Babb in Alaska last year.

(*Continued on page 51*)

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Brush Up Those Landings

(*Continued from page 31*)

but at the same time will cut your speed, up to the point where the angle is sufficiently high (approximately 16°, varying with type of airplane, load, etc.) to make it impossible for the airflow to follow the curve of the wing's upper surface. The airflow then separates from the wing surface, spoiling the lift. At this point the airplane is "stalled," even though there is forward speed and hence some air flowing over the wing. But at all speeds below the stall point, it does not matter whether the wings are off, on, or folded—they can't give you any support. The combined concept of *speed loss* (airflow) and *attitude* control in order to get in three-point position is the technique to practice up on. Under instruction—and *not* to be tried on your own hook (remember the 51 per cent figure of accidents on the landing roll), you can grasp this technique better by stretching out the landing process so that you have time to see what's happening. In other words, put it in "slow motion." A landing roll involves much the same factors as the take-off run, both being transition periods between being airborne or groundborne. So try making several "dry runs" (get all ready to take off but ease power back just before the point where you would leave the ground) to see the effect of the stick movement on attitude when you're hovering right between having the plane's weight carried by the wings or by the wheels. You'll see that easing back on the stick too quickly when the wings are carrying most of the weight of the plane will tend to balloon you up in the air (increased lift with increased angle of attack). Easing back at a slower rate will allow you to change the attitude of the plane—raising the nose from level flight to landing position—without a gain in altitude. If you try the effect of elevator movement when you are below take-off speed (below the stall point) when the weight can no longer be carried by the wings, the stick will be much less effective in raising the nose to proper position for a landing, *i.e.*, as the speed is decreased, the elevator control has to to be displaced further and response is slower. Thus on a landing, if you are not in proper landing attitude with your wheels almost on the ground when speed is lost (below stall speed when the weight can no longer be supported by the wings), you will be dropped to the ground abruptly with the stick ineffective in raising the nose to proper position for a landing. Simulated take-offs such as described offer additional practice in handling the airplane under the conditions encountered in a landing roll, thus learning rudder as well as elevator control and control *effectiveness* at varying speeds. Actually, landings are one of the least difficult maneuvers. Air Force custom in lightplane training was to solo the student on only 20 or 25 landings.

A pilot has many "assists" nowadays for landing. For example, trim. Modern airplanes in general, have a larger speed range than former models. An airplane cruising at 150 mph with the nose on the horizon is built to handle easily at that speed and attitude (little control force required of the pilot). At slower speeds, the airplane will usually be nose heavy, requiring the pilot to exert a recognizable stick force to hold it up. It would be uncomfortable to fly for any length of time exerting that force. For this reason, elevator *trim* has been provided. This is a mechanical or aerodynamic means for the pilot to "set" the controls to maintain a desired attitude without requiring control pressure on the stick. An airplane will require a different "trim" not only at different speeds but at different flap settings, cabin or fuel loads, and landing-gear position.

On landing, when the attitude of the airplane is to be changed from glide to three-point position, using the trim mechanism makes the pilot's work easier and allows a much better landing.

In crosswind landings, the thing to concentrate on is to see that the airplane's flight path is straight down the runway, and that the wheels at the moment of contact are lined up parallel to the runway. In the past this had to be accomplished by 1) crabbing to make the flight path good and then kicking the crab out with rudder just before touchdown, or 2) by lowering one wing into the wind to stop drift and continuing down with aileron into the wind on the landing roll. With the Crosswind Gear, however, you can hold your crab right on through the landing as the landing wheels are not fixed parallel to the longitudinal axis of the airplane but are free to swivel. Thus, the wheels will caster into line with the runway on contact while the nose of the airplane can be weathercocked many degrees off the runway, into the wind.

The tricycle landing gear arrangement, while not actually new, is sprouting on most of the newer model airplanes. When used in the manner intended, there are definite advantages to this type of wheel arrangement. While they have not been used for a sufficient length of time to have the story show up in the statistics and, admittedly, there is no comparative data on exposure, there is some indication that their landing record may be slightly better than that of the tail-wheel type arrangement: 50,664 airplanes, equipped with conventional gear, representing 66 per cent of all aircraft considered airworthy, accounted for 70 per cent or slightly more than their share of the landing accidents in 1948. Presumably, the tricycle-gear planes accounted for a *lower*-than-average amount of accidents in 1948.

Using the tricycle-gear airplane correctly requires a knowledge of the construction. The nose wheel is not of sufficient strength to bear up under a "nose-wheel-first" landing. Thus, the airplane should *never* be in a stalled condition off the ground where there is the chance of its dropping in on the nose wheel. The first complete *washout* of a B-36 occurred recently when the pilot misjudged (presumably because the cockpit is so high off the ground) and made a nose-low landing. Even the sturdiness of a military plane is not sufficient to allow the landing load to be carried by the nose wheel alone.

For best results, establish a glide, flare out "over the fence" and, when still comfortably above stalling speed, ease back on the stick to a nose-high attitude, touching down on the main wheels just before or at the same time the stall speed is reached. The advantages of the tricycle gear come in at this point. You can touch down at higher speeds because on contact the lift can be "spilled" by easing the nose wheel down on the ground (at a more shallow angle of attack the lift decreases). In this position the airplane is on the ground to stay (near cruise position—airflow must be as high as cruising speed to give enough lift to put the plane back in the air). Brakes can be applied without danger of nosing over.

The center of gravity of the tricycle-gear airplane is forward of the main wheels so that on the ground the airplane weight will be distributed on three wheels. On take-off, unless you wait until cruising speed is attained, the airplane will not fly off by itself (unless the trim is set nose-high). On a take-off run, the nose wheel should be raised off the ground when about 75 per cent of minimum flying speed has been attained,

(*Continued on page 58*)

TOWER MAN signals a PT-19 as it comes in for a landing at Buchanan Field near 'Frisco

Pilot Report . . . D H Beaver

(*Continued from page 49*)

Even the paint job on the *Beaver* is well planned. The ship is painted bright yellow with black trim that would be a cinch to spot from the air over forests or snow fields.

All non-essentials have been left off the *Beaver*. The ship could do with an arm rest for lazy pilots, re-location of the trim tab and a number of little things, but there has been a good reason for not adding extra gadgets. This ship has been designed to operate far from high-class maintenance shops, and the fewer the gadgets on the airplane, the less trouble the ship will cause. The factory states that the first 60 *Beavers* operated for two years with less than $2,000 in parts being shipped out to the whole group.

When we arrived at the Bishop Airport the next morning, scud clouds were scurrying across the sky from the west. Wind on the ground was still calm, but the higher clouds were in a hurry. To the west, the tops of the High Sierras were blanketed with a heavy layer of clouds.

Bob Symons, one of the old-time Bishop pilots, explained that this looked like one of those rare days when the "Bishop Wave" was in operation. All existing glider altitude records have been broken in this meteorological phenomenon. (*"The Big Wind Factory,"* SKYWAYS, *July 1949*)

"You're going to have a rough ride going home," explained Symons. "Stay on the deck as long as you can to keep out of the turbulence."

After a quick check with the Weather Bureau—Los Angeles had a mile and a half with smoke and haze—we piled into the *Beaver* and took off.

It was rough . . . and then it got rougher. Close to the ground an increasing surface-wind made dust literally boil up from the open fields. The ship tossed around to the point of being uncomfortable. The long, husky wings flexed perceptibly and we were darn glad that the specifications of the *Beaver* call for 5¼ G's to withstand gusts up to 66 feet per second.

The weather became so turbulent close to the ground that we decided it would be safer to head upstairs. Then we plowed into the "Bishop Wave."

Ten thousand feet should have been high enough—so at 10,000 feet the power came back to cruising. We still went up at 2,000 feet per minute. To make a long, rough story short, we spent nearly 15 minutes at 13,000 feet with the power almost all the way closed, and then had to dive to over 140 mph Indicated to keep from going higher. Even without power—except enough to keep the engine warm—we were reading 2500 feet per minute *up!* The up-drafts of the "Bishop Wave" were a liberal education. The five pilots in the *Beaver*, with flight experience totaling over 27,000 hours, agreed that this was the roughest weather in which any of us had ever flown except under instrument conditions.

Later we picked Nolta's cigars up off the floor where they had landed after flying out of his pocket.

The next day, we received a letter from Bob Symons, telling of his experiences later the same day. First, let us assure that Mr. Symons is not addicted to "throwing the bull." He has flown in the Bishop area for over 20 years and at one time held the world's altitude record for gliders. Here's what he reported:

"I tried to call you about 1.30 p.m., but all the phone lines were blown down by the wind. I took off with the P-38 (used for high-altitude rain-making. *"I'm a Rainmaker,"* page 16) to check the clouds for seeding possibilities. When I returned to the field, conditions were zero-zero due to dust, and 60 mph gusts, so I flew along the front of the roll cloud down the valley to wait until the dust settled a bit.

"With my engines throttled clear back, I kept climbing, so I feathered the left prop. Still I climbed, and at 16,000 feet I feathered the right prop too. I still climbed and was able to soar to 30,000 feet with both engines feathered!

"There I quit because of the cold. Bill Partridge was in the nose and we both wore electric 'bunny suits,' but I was saving the battery to unfeather the props. I soared there for an hour and a half waiting for the wind to decrease on the ground and for visibility conditions to improve. I descended several times to 16 and 18,000 feet and then went right back up again—still with both engines feathered. Sometimes the rate-of-climb indicator showed as much as 3,000 fpm up. I could have stayed there all day because the lift was still good at 30,000 feet."

After flying through the edges of this wave, none of the five pilots in the *Beaver* were in a mood to doubt Mr. Symon's statements. It had been a wild, rough and wondersome ride!

This experience in the *Beaver* proved the Canadian-built ship to be ideally suited for rough-weather flying. While the airframe is built in Canada, it lives up to all American AN standards. Engine, propeller and instruments are all made in the United States. Even in extremely turbulent air, the ship responds perfectly to the controls. There is enough extra "beef" in the structure so that you don't develop grey hairs worrying about shedding any essential parts. Also, there is enough emergency power forward of the fire-wall to pull you out of trouble.

As we came in over Palmdale, letting down toward Glendale, we could see a solid layer of fog over the whole Los Angeles valley. Glendale was giving a mile and a half with thin breaks in the overcast.

N93299 had a large loop for the RCA receiver and we tuned in on the Burbank range station to "bird dog" with the aural null toward the ground station.

Once over the San Fernando Valley, main boulevards could be seen directly beneath us through the haze and we "drove" down the main street of Burbank to the Glendale Airport. One quick 360° turn and we were on the ground.

The past hour and 52 minutes had been quite an experience.

The *Beaver* is not in the conventional lightplane class. It is a workhorse designed to do a job of air freighting. The ship isn't built as a speedster, but it does get in and out of postage-stamp fields in a hurry.

The more you fly it, the better you like the *Beaver*. Once around the field isn't enough to begin to appreciate the fine design work that has gone into this ship. You'll have a few surprises left in your flying career until you fly the *Beaver* in high country.

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S-6 Check one: ☐ Veteran ☐ Non-Veteran

FLIGHT PARTNER John McDonald rides in the nose of the P-38, dumps dry ice out a chute

I'm a Rainmaker

(*Continued from page 43*)

and we carry two emergency oxygen units. Each of us has a walk-around bottle that is good for an hour at 40,000 feet and a bail-out bottle that is good for 10 minutes if you are not doing any physical exertion.

I use much less oxygen than the average high-altitude pilot. I believe that is the result of having lived here at Bishop, 4,000 feet above sea level, all my life. My system seems to be keyed to get along on less than the average amount of oxygen.

On one flight the whole Owens Valley was "socked in" with clouds and we had to spend over an hour at 24,000 feet. McDonald's oxygen supply began to run down so I headed east in a hurry and flew nearly 100 miles to Tonopah, Nevada, before we found a hole to let down through.

During the war I had a little Link trainer time while instructing in gliders at Wickenburg, Arizona, but my instrument flying was largely self-taught. Back in the mid-'30's, I used to dabble with cloud flying in a Bowlus glider and after getting into a screaming spiral dive a few times, I learned how to handle a needle-and-ball instrument.

When we first decided that the AT-6 wasn't enough airplane for this job, I went to Portland, Oregon, and picked up this surplus P-38. The only twin-engined airplane I'd ever flown before was a twin-Cessna. The first hop I made in the P-38 came near being my last. I had one of the pilots on the field show me how to start the engines and then I took off for Reno, Nevada. It began to get cold at 15,000 feet so I hunted around in the cockpit for the cabin-heater control. The whole cockpit began to smell of exhaust smoke and gas fumes so I shut the heaters off in a hurry. There was still exhaust gas coming in through the vent so I used a map to scoop fresh air into my face from the cabin intake. I darn near froze all the rest of that trip. When I finally had the airplane safely in the hangar at Bishop, I began checking through the tech manuals of the P-38 and found that the mechanics who had replaced the superchargers had sawed off the heater intake tubes so that I was getting pure exhaust gasses in the cockpit.

That's the only trouble I've had with the ship aside from losing engines from icing while flying on instruments inside the clouds. Above 20,000 feet you're supposed to use electrical boost pumps in addition to the regular engine-driven fuel pumps, but even then we'll sometimes pick up a vapor lock at high altitudes when it is extremely cold outside.

With this type of seeding, we are not pilfering water from anyone else. If these clouds were not triggered here in the Owens Valley, they would completely disappear before they passed over the White Mountains bordering Death Valley to our east. In fact, many times a storm will start over the White Mountains after we have started one with dry ice over the Sierras.

Only certain types of clouds will unload moisture by dry-ice seeding. You can't find just any old cloud, fly over the top of it with dry ice and expect it to rain. The cloud must be at least 3,000 feet thick and well filled with plenty of super cooled moisture droplets. If there is an additional supply of moist air feeding into the cloud, the created storm will have a much better chance of really dropping a measurable amount of moisture.

It doesn't do much good to seed clouds if they are high above the ground level if the air between them and the ground is hot and dry. The moisture from your man-made storm will evaporate before it reaches the ground.

Sometimes you can louse-up the whole procedure by dropping too much dry ice. Here's how that works: when you drop a large quantity of dry ice, a majority of the moisture droplets are changed almost at once into ice crystals. That leaves very few moisture droplets to form on the ice crystals and make them grow into snowflakes. Essentially, you have changed the cloud from one stable state to another one—from nearly all moisture droplets to nearly all ice crystals. This technique is sometimes used to keep thunderstorms from building up so big that they could cause ground damage from hail, lightning and possible cloudbursts.

Natural dust and smoke will trigger clouds when the temperatures get down to the critical point for that particular dust or smoke. The critical temperature varies with the type and size of foreign particles.

Silver iodide smoke will generally work well as an artificial nuclei at temperatures below —8°C while dry ice will work at any temperature below the melting point of ice (32°F). I have tried silver iodide smoke, both from the ground and in the air. Silver iodide is difficult to use from the ground because, once it is generated into smoke, you can't control where it will go or how much of it will get there. It is just as easy to over-seed a cloud as to under-seed one when you have so little control over the smoke.

Silver iodide smoke generated from an airplane has a much better chance of being controlled. It should be introduced into the base of a cumulus cloud where the natural up-currents will draw it up until it finds the super-cooled moisture droplets of critical temperature. Here the pilot can squirt out a little smoke, watch the results and then seed a little more in a few minutes if necessary.

This technique is good only with clouds which have up-drafts in them. It doesn't work well on stratus clouds. It might be possible to fly along just in the bottom of the cloud and release the smoke, but if those stratus clouds are stuffed with mountain peaks up to 15,000 feet, there wouldn't be much future in the whole business.

If the stratus clouds were seeded on top without some method of carrying the smoke down to some depth, only the tops would be nucleated and the resulting reaction would normally be very slow.

These man-created storms are much gentler than storms that are started by nature. A nature-made storm builds up for a long time and when it lets go, it thunders, lightnings and rains to beat the band. With a man-made storm, we trigger the cloud before it is actually ready to unload its moisture and the nuclei formed by the dry ice make the storm unload long after a normal storm would be all through. In that way, the rain is much more gentle even though it may last longer.

One of the most challenging problems of this whole project is getting the snow to fall in the particular cups where your powerhouses are located. One day McDonald and I were up and there wasn't a cloud near Bishop Creek but there were a few promising cumulus about 10 miles away on the other side of the ridge. Since we were up there anyhow and had the dry ice with us, we experimented by lightly seeding just the edge of the clouds nearest our canyon. The clouds began to boil up and attract moisture from the surrounding air. Soon the cloud had expanded to cover about half of the gap toward our canyon. We went back and re-seeded the edge near the canyon and the cloud continued to build. After a few minutes more, the cloud had puffed up like a PIBAL balloon and worked over to the edge of our canyon. Then we flew over and seeded to beat the band. The cloud unloaded right there and we had a nice crop of unexpected snow. There are a lot of sheepherders in this country, but McDonald and I are the first cloud-herders.

The power company purposely restricted

our operations to this one canyon so that they could compare the results with other canyons to the north and south of Bishop. In the two years that we have operated, we showed a 14 per cent and 12 per cent increase. At Rush and Leevining Creeks, some 60 miles to the north, the run-off was in line with normal expectations.

The project was originally started after Albert Cage, President of Cal-Electric, made an inspection tour early in January, 1948. There had been practically no precipitation in January even though the clouds were continually coming over the mountains. Where snow was usually piled up in drifts, the highways were open and only a few patches of snow were to be found on Tioga Pass going into Yosemite.

A few days later Mr. Cage appointed Mr. Cundiff to make this experiment his number one project. Now Mr. Cundiff says that he expects this type of seeding to become a common practice within a short time.

"We believe that the same thing could be done all along the Sierra, and anywhere else where weather conditions are similar," continued Cundiff.

There was a general "brown-out" in the nearby San Joaquin Valley because of a power shortage and Cal-Electric was paying above the normal price for fuel at the San Bernardino steam generating plant. Also, it bought power wholesale from other companies for the unusually high price of four mills per kilowatt hour. And dry ice costs only about $50 per ton!

Some of our best technical aid has come from the U. S. Weather Bureau here on the Bishop Airport. Elvyn C. Pye, head of the Bureau, believes that the results we have obtained here will apply at many other points.

"Here we frequently have a feed-in of moisture over the Sierra from west to east. Most of it is dissipated into the dry atmosphere. Under these conditions you can make more moisture fall than would fall naturally," says Mr. Pye.

Until the high altitude began to bother him, Mr. Pye was a frequent observer on these seeding flights. Now he is the eye on the ground that helps fill in records of what happens after we have dropped our cargo of ice.

In an effort to prove to some skeptics that this seeding really works, I've had to buy an aerial camera and learn to use it. Usually McDonald has the camera up front with him and shoots through the optically-flat glass of the ex-photo nose on the P-38. Now I've built a darkroom in one closet at home to process the pictures.

The whole thing is a fascinating project. There's more challenge to it than in any flying I've ever done. Sometimes the weather conditions get a little stinking—there's no paint left on the leading edges of the wings on the P-38 because of heavy icing. Cal-Electric figures roughly $200 per hour to keep the ship in the air. Aside from making a living out of rain making, the downright fun of the job is in trying to outguess the weather.

Mark Twain once said, "Everybody talks about the weather, but nobody does a thing about it."

I do!

It may not make you feel like an Indian God to make rain where it will do it some good, but it comes mighty close to it. +++

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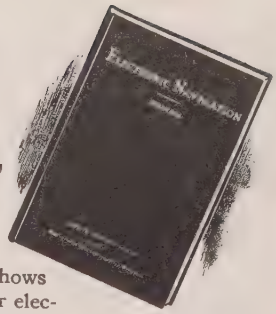

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Camaguey	80, 91, 100	2.50	TD	Good	12.50
Santiago	91	2.50	TD	Fair	12.50
Cap Haitien	91	None	TD	Poor	*
Port-au-Prince	91, 100	None	TD	Good	15.00
Ciudad Trujillo	91, 100	4.50	TD	Good	30.00
St. Croix	80, 91, 100	2.00	TD	****Good	None
St. Thomas	80, 91, 100	2.00	Both	Good	None
St. Kitts	100	3.00	TD	Good	None
Fort de France	91, 100	None	TD	***Good	None
Antigua	100	None	TD	**Good	2.00
San Juan	80, 91	None	Hangar	Good	None
Nassau	80, 91, 100	1.20	Hangar	Good	1.60

*—Not Port of Entry
**—Little Service
***—Field unfinished
****—Under repair

Flight to the Caribbean

(*Continued from page 35*)

expenses and prepared the papers necessary for the next landing.

At Miami I had to go to the Cuban Consulate to obtain my clearance for Rancho Boyeros, the airport of entry at Havana. Though I had written many letters to the Cuban officials, I could not avoid that procedure. The cost of clearance was $10 and was the first of a long list of very expensive duties we encountered in Cuba.

Saturday morning, after a night in Miami, we cleared customs, filed our first flight plan and, wearing fishing kits, Mae West jackets and parachutes, took off for Cuba. We first flew along the Florida Keys, buzzing a few feet above the light blue water between the islands, ducking here and there a flight of flamingos. At Key West we climbed to 4,000 feet and turned southward toward Havana. Soon there was nothing but blue water and white cumulus. I was flying the southwestern leg of Key West Radio and, at the same time, homing on an Havana radio station. This was about the only time during the entire trip that I used the radio-compass for navigation. We navigated all the rest of the time by dead reckoning.

About 40 minutes after leaving Key West we got our first glimpse of the coast of Cuba. For a while we thought it was only the shadows of cumulus on the sea, but soon we were above Havana, admiring the bright contrast of the red clay roofs, the white walls, the blue water of the harbor and the green sugar cane fields south of the city. A few minutes later we landed at Rancho Boyeros . . . and our troubles began!

Customs and immigration in Cuba are slow and expensive. The officials are uncooperative even though you have all the necessary papers and all information filled-in in advance. Next we found that our authorization from the Cuban Army to fly above Cuba had been lost by the officials and that we could not take off until it was either found or replaced. We had planned to resume our trip the next morning but this forced us to spend an extra day in Havana. Nevertheless, we liked the city: the fascinating contrast of the old and the new, the old Spanish buildings, the open-air trolley, the guitar players, the peddlers and beggars. We had a good time watching the cock-fights, visiting the town and Morro Castle, enjoying the colorful night-life, eating all sorts of delicious tropical fruits and drinking strong black coffee, foreign wine and local rum.

We took off early in the afternoon of December 19 for Santiago de Cuba. We climbed above the scattered cumulus at 7,000 feet and had a wonderful flight, enjoying the view of the Atlantic and the Caribbean lapping the northern and southern shores of the island. During the entire trip I found it best to cruise at a minimum of 6,000 feet, above the cumulus, where the air is cool and smooth and where there would be ample time for action in the event of an emergency. We stopped for a quick refueling at Camaguey which, like Rancho Boyeros, is a large airport. We arrived at Santiago a few minutes after sun-down and made a difficult landing on its rough unlit field bordered by steep hills. We were warmly welcomed by the soldier on duty and the natives who, like everyone in Santiago, were very friendly. Our short visit to Santiago was a lively and amusing experience.

The next day, after a long hike, a wonderful swim and more costly red tape, we were back at our customary stations, flying at 6,000 feet en route to Cap Haitien, 300 miles away, in northern Haiti. After an hour of eastward cruising along the coast, we left Cuba and turned toward Haiti, concentrating on navigation and temporarily forgetting Santiago, its good wine and pretty girls. Forty minutes later, Alain was the first to sight land, and according to our custom, Henry and I were to offer him a drink after landing. But it was not the time to think about drinks; the clouds just ahead of us were forming a bulky menacing mass as I started our let-down. Soon afterward we were flying low along the coast in and out of squalls and under a 2,000-foot ceiling of black clouds which hid the top of the mountains. At that time of the year, as we later found out, the rainy season comes to northern Haiti, and everything we saw along the wild coast was flooded. We finally reached Cap Haitien but, blinded by the rain, we had a hard time finding the airport, a 2,000-foot strip of grass covered by water and spotted with cows.

After a skiddy landing we were again involved in red tape. This time, however, the officials spoke French, my native language. We had come to Cap Haitien to visit that former French capital and to see the ruins of La Citadelle built by the Emperor Henry Christophe. These plans went awry because the rain had washed out the road and the telephone lines and made everything difficult for the Haitian Army which controls the place. Though we had our clearance for Cap Haitien, we learned we should have first entered Haiti at Port-au-Prince. To put it mildly, we were in a difficult position.

We established ourselves for the night and then went on a tour of this town where present misery clashes with vestiges of a past prosperity. During the night the rain stopped, the field dried off, and in the morning an Haitian Air Force twin-engine Cessna arrived from Port-au-Prince to escort us there. We took off in its company. We had not been allowed to fly to a near-by private field to refuel and, since there was no aircraft gasoline in Cap Haitien, we had to put automobile gas in the plane. The Cessna had taken all our luggage, but the officers had refused to take Alain and Henry to lighten "Fantastic." The bad performance of the engine made it impossible to gain altitude so we had to fly down the valleys between 3,000- and 5,000-foot mountains. After a grim hour, we reached the beautiful bay at Port-au-Prince and, in the company of the Cessna, landed at its modern International Airport.

(*Continued on page 56*)

Air Transports' Next Step

(*Continued from page 25*)

jet transports will be unable to match, possibly requiring special priority in the traffic pattern.

Turboprop airliners will operate at higher cruising speeds and will provide greater passenger comfort than present transports. Most of the noise and vibration now encountered in piston-engine planes will be eliminated in the switch to smooth-running gas-turbine engines. This will also have a favorable effect on maintenance costs, since certain service operations are necessary because of vibration caused by piston engines. The decreased weight and drag of turbine-propeller installations result in greater operating efficiency and increased payloads.

Convair has traditionally been one of the main suppliers of flying boats for the Navy. Here, too, the turbine-propeller is in the picture with the current installation of four Allison T-40-A-4 turboprop units (coupled T-38's) in the high-speed, long-range XP5Y-1 for antisubmarine warfare.

Development of the Allison turboprop and its successful testing to date represents a feather in the cap of Navy's BuAer. When the Air Force switched from its turbine-propeller program (including the General Electric T-31, Flader XT-33, Wright Aero's XT-35 *Typhoon*, and the XT-37 Turbodyne), to turbine-jet engines, the Navy stuck to its guns and kept their turboprop development going. In addition to the Allison T-38 and T-40, a more powerful and quite promising Pratt & Whitney unit (PT-2) is well along in bench-test running, and a still more powerful Allison engine is in the works.

One advantage of the turboprop over the turbojet for commercial installations is that they may be used in American airframes presently in operation, such as the *Convairliner* and Martin 2-O-2, and will not require specially designed airframes. The pressurized Martin 3-O-3 was given up before the prototype flew, but has been revived in the 4-O-4 version which will take turboprops as soon as these are available for commercial production.

The Allison T-38 unit will be the first of these. It comprises a 17-stage axial-flow compressor, eight tubular combustion chambers and a four-stage turbine. Its compression ratio of 6.3:1 is higher than any other aircraft gas turbine now running. It weighs 1,225 pounds and has a combined power output (shaft horsepower plus jet thrust) of 2,750 hp. This gives a highly favorable weight/power ratio of better than two horsepower per pound. The specific fuel consumption is at present 0.63 pounds per shp per hour, but it is expected that refinements due to operational testing will bring this down to 0.58 pounds in the near future. This is fairly comparable to the figures for today's big high-power piston engines, such as the *Wasp Major* and *Cyclone 18*.

On the coupled T-40, the common gear box uses a two-stage reduction with spur gears engaging a compound planetary gear system to drive the two contra-rotating 15-foot Aeroproducts propellers. The T-40 weighs 2,500 pounds and has an output of 5,500 eshp (equivalent shaft horsepower). About 90 per cent of the power generated by the gas turbines is used to turn the propellers, with some 10 per cent utilized as exhaust jet thrust.

The nearest British equivalent to the T-38 is the Bristol *Theseus*, which has had extensive service testing in a modified *Lincoln* in RAF Air Transport Middle East runs, and is now flying in the Handley-Page *Hermes V* experimental airliner. With a maximum output of 2,500, eshp (equivalent shaft horsepower), it weighs 2,205 pounds, has a diameter of 54 inches, and a fuel consumption of 0.86 lbs/shp/hr. The T-38 beats this on all counts.

The latest versions of the Rolls-Royce *Dart* and Armstrong Siddeley *Mamba* are turning up close to 1,350 to 1,400 hp, about half that of the T-38, and they weigh 850 and 780 pounds respectively, with a specific fuel consumption (sfc) of 0.87 pounds for the *Dart* and 0.89 for the *Mamba*.

There are three British coupled turboprops which can be compared with the Allison T-40. They are the *Double Mamba* (2,850 eshp, 2,000 lbs), the Napier *Coupled Naiad* (3,150 eshp, 2,200 lbs), and the Bristol *Coupled Proteus* (7,000 eshp, 7,180 lbs, sfc 0.63 lbs). The *Coupled Proteus* has about the same fuel consumption as the T-40, is more powerful, but has a heavy disadvantage in weight, with a weight/hp ratio of 1.02 as against the T-40's highly favorable 0.50; its flight tests are also many months away.

This brief survey of the situation may serve to point up a remark made to the writer by a British engineer last year to the effect that Allison was apparently achieving certain results which were at that time better than anything they could show, and that it would probably mean a sharply renewed interest in the turbine-propeller powerplant in the United States.

Coming back to the *Convair-Turboliner*, it seems certain that Allison's flight-testing program will be watched with the greatest possible interest by airline-operations men and also by the Air Force. If the USAF decides to modify some of its Convair T-29 crew trainers to take T-38's, this will speed up developments and help solve the tough financial aspect of the problem. In any case, the Air Force is expected to go ahead with its turboprop version of the B-36. This will be the B-36F, planned for high-speed operation at altitudes well above 50,000 feet.

Other companies besides Convair are expecting to get into the act with turboprops during the next year or two. The Martin 4-O-4 will take two T-38's, the first installations probably being the 35 *Double Wasp*-powered 4-O-4's for Eastern Air Lines and the 30 for TWA. Other orders are naturally hoped for. The *Convair-Turboliner* will have the jump on the 4-O-4, however, and with American's big fleet of present *Convairs*, plus those of Continental, Mid-Continent, Northeast and Western Air Lines, a good market is anticipated. The *Turboliner* may well break into other airlines facing DC-3 replacements, such as United, National, Braniff, Chicago & Southern, Colonial and Delta, but will have to face stiff 4-O-4 competition as well as that of the Douglas *Super DC-3*, a start in which has been made by Capital Air Lines. The *Mamba-Dakota* will also provide an economical method of extending the airline service life of the world's most popular and flyable commercial transport to date—the DC-3.

Douglas may come out with turboprop versions of the DC-6A and DC-6B models, using

(*Continued on page 59*)

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PILOT-AUTHOR HENRION let "Fantastic" roll to the end of the strip at St. Martin. Boys went swimming practically under plane's wing

Flight to the Caribbean

(*Continued from page 54*)

At the field, customs were efficient but the fees were $15! A group of natives tried to convince us the plane had to be guarded while on the field (at the rate of five dollars a night), but since the plane could be locked, we decided this was unnecessary.

We had a good time in Port-au-Prince, but were disappointed to find that there was no beach or swimming in the vicinity of the town. Everything there captured the imagination: the natives, their customs, their work, the infinite variety of fruit and flowers and the beautiful, wild country surrounding the town.

Too interested and too busy, we did not relax in Port-au-Prince and so were tired when we took off at 7:00 a.m. on December 22. I headed "Fantasic" toward St. Croix in the Virgin Islands, 500 miles away. We first flew to Ciudad Trujillo for refueling. We did not go straight but followed the route of the airlines which avoids the dangerous mountains by going first to Barahona and then following the coast. Ciudad Trujillo is notorious among pilots for its high fees, but since we had written its officials many letters and did not leave the field, we were charged only a modest (!) $18.50. We were quickly able to take off again and soon were at 9,500 feet. The visibility was such that from the eastern shore of the Dominican Republic we could see the coast of Puerto Rico a hundred miles away. Finally, we reached St. Croix, but the island was so beautiful we flew above it for half an hour before landing.

We quickly learned to love that friendly easy-going island with its constant good weather . . . and red tape was fast and free! The airport and its service were excellent. We rented a Jeep and freely zoomed under the palm trees along the sugar cane fields and among the ruins of big estates and sugar mills abandoned since the abolition of slavery. We spent our time swimming, fishing and relaxing. By the end of our sojourn there we were convinced that if any of us ever got married, St. Croix would be the place for a wonderful honeymoon, comfortably installed in one of its two very good hotels.

On the 24th of December we left on schedule for Martinique. After 100 miles of open water, we reached the unique Dutch island of Saba, not more than five miles in circumference and 2,800 feet high, whose only town is built in the crater of an extinct volcano. A little later we sighted St. Kitts which is also a volcanic island and, like all these islands, was covered by impressive clouds. We landed at its airport and spent a few hours visiting the town of Basseterre. At St. Kitts all the officials did their best to help us. Later on, in the other British islands, we found that same wonderful attitude and organization. After refueling with 100-octane gasoline, the only kind available, we headed for Martinique.

We cruised low in the hot afternoon. We passed Nevis and Montserrat, over-flew Guadeloupe and were about to reach Dominica when the engine, which had been heating up since we were using 100-octane gasoline, became alarmingly hot. I had made the mistake of flying too low and there was nothing I could do. Along the west coast of Dominica things became worse as the pressure of the over-heated oil started to drop. An emergency landing was not possible in the rough volcanic islands covered with wild tropical vegetation so, tense and ready to ditch, we flew on to Martinique a thousand feet above the blue water and flying fish. But once more "Fantastic" made it, and 30 minutes later, we were above the unfinished airport of Martinique. The future 4,000-foot runway was only half-finished and we made our approach above bull-dozers and a high-tension line used for the construction work. This power line cut right across the strip, but we cleared it and came in all right. We had reached the goal of our trip and were right on schedule.

Of all the islands we saw, Martinique was the most tropical. Under the burning sun and frequent rains, its gorgeous vegetation grows wild everywhere in a conglomeration of giant ferns, bamboo, mahogany, orchids, bougainvilleas. Fort-de-France looks very much like any French harbor—with the possible exception of its filth, and the colonial dress worn by its inhabitants. We spent Christmas driving through the island with a wild French driver who zoomed over the narrow tortuous mountain roads and frightened us more than we had been at any time in the plane. After an interesting visit to the town of St. Pierre, completely destroyed by a volcanic eruption in 1902, we relaxed with a wonderful swim and spent a charming evening in the French Christmas manner.

Early the next morning, after a bad night in an uncomfortable hotel, we were back at the field. I completely checked the engine, changed the oil and, after a few tests in a torrential rainstorm, decided it was all right. I then fixed the slightly loosened tail wheel while Henry simonized the plane and Alain supervised the "bucket brigade" gassing up.

We finally took off, heading back towards the States. During the trip back, we were helped by the trade winds which blow regularly at this season at 25 knots from ESE through the West Indies. This time we flew along the eastern shore of Martinique and Dominica. There the trade winds, arriving hot and humid from the sea, suddenly cooled as they climbed the 5,000-foot mountains and caused the most brutal rain I've ever seen. I still wonder how "Fantastic" managed to swim through it. If we had known about this during the trip down, we could have cooled the engine by simply flying the eastern side of Dominica.

We arrived in Antigua for lunch and, after a tour of this prim little island, left for St. Martin, a Dutch-French island lying northeast across 120 miles of water.

I did not brake the ship as it landed on the strip at St. Martin and we rolled to the end of a concrete runway that was bordered by a white sandy beach. Soon we were enjoying a swim practically under the wing of "Fantastic." Old-fashioned St. Martin has remained practically untouched by the modern way of life, but we still found its only hotel a comfortable one. The island is very quiet, friendly, and beautiful. Although there is no service at the airport, I would certainly return to St. Matrin if I should ever again fly through the West Indies.

The next day we were at St. Thomas, an island forming a direct contrast with St. Martin. St. Thomas is expensive, and well organized to receive the tourists who flock there. Everything is very gay, and after sailing, swimming or fishing, there are always good parties.

We spent the night there and continued on to Port-au-Prince after a brief stop-over at San Juan. This city is also well organized for the tourist trade but, unlike St. Thomas, it has preserved but little of its ancient Spanish flavor. It is very commercial and reminded us somewhat of Havana. The airport service and the Customs were

(*Continued on page 59*)

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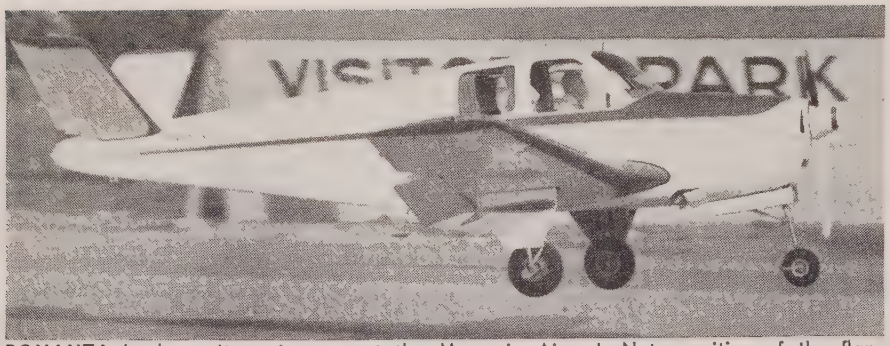

BONANZA lands on its main gear at the Monrovia Airport. Note position of the flaps

Brush Up Those Landings

(*Continued from page 50*)

and the airplane handled in the conventional manner from there on. On gusty days, the landing should be made at a slightly higher speed with the nose a little lower than usual before touchdown, then with the nose eased on to the ground as quickly as possible after touchdown. Ground visibility of the tricycle-gear plane is greatly increased over the conventional-gear type, and handling conditions such as in mud or other soft ground are considerably easier. Sharp turns will be a strain on the nose wheel and should be avoided.

The main concern on muddy or soft-field operations is the limit imposed by the depth of the mud. If the wheel remains clear of mud from just below the hub up, operation is possible. However, if the nose wheel sinks into the mud to the hub or above, the airplane will actually be pushing right down against the wheel, since the weight will be thrown forward, and the force imposed may snap the nose-wheel strut.

Valuable hints for soft-field handling of tricycle-gear airplanes come from Mallard Air Service, *Navion* distributors at Teterboro, N. J. Rather than force your way around a turn, if you must operate in deep mud and risk damaging the nose wheel, they recommend getting out and putting your weight on the tail skid, raising the nose wheel clear, and trundling the airplane around to the desired position. Experienced at *Navion* handling under challenging conditions, Arch Denny, Mallard Air Service pilot, has done considerable experimenting on sand operations. On a demonstration flight in Vera Cruz, the sale of an airplane to a sportsman-fisherman depended on whether or not the airplane could be operated on beaches. The sand was soft enough to slow the airplane to a dead stop without use of brakes in 120 feet (a 500-foot run is par for normal airport conditions). Arch got out—and easily. He claims that as long as you can get the airplane moving for even one foot, it will keep going and you'll get off, although perhaps requiring double the take-off run. He gets going in the sand or mud by placing a block of wood (about two feet long) in front of and as close under the main wheels as possible to give enough traction to start. Don't ever put a block under the nose wheel as the block may twist on end and hit the propeller. If correct technique is used, Arch feels a sturdily constructed tricycle gear gives tremendous utility with fewer operating limitations than the conventional-type gear.

One of the most critical landing techniques is the emergency landing. A poorly conducted and unwisely attempted short-field emergency landing is usually the beginning of the trouble. Lack of knowledge as to just what to avoid in an emergency landing puts the pilot at a further disadvantage. You want to 1) accelerate in an area that offers *uniform* resistance, 2) *fly* in with *control* as slowly as possible, 3) avoid having the nose of the airplane contact anything hard, 4) establish a flight path that is as far as possible *parallel* to the ground (*i.e.*, sliding over the ground rather than digging into it).

Choosing a smooth field where you can land but which ends you smack up against a brick wall when you're still clipping along at a good rate on your landing roll will do you little good. You want to choose a spot offering uniform resistance, *i.e.*, which will absorb the energy of the "crash" (if the field is too small) uniformly, not abruptly. If necessary, drag the wing parallel to a fence where it will clip the fence posts as it goes by. If you're headed for a grove of trees, keep the nose pointing toward a clear spot so that the wings hitting the trees will absorb a lot of the energy. In all cases, keep the nose and cockpit structure as intact as possible by having the rest of the airplane take up the shock first. That's energy absorption by collapse of structure.

Fly in under control rather than risk letting it stall in so that you are sure you can place the airplane where you want it. The impact force will vary with the *square* of your touchdown speed, so the slower the better as long as control is maintained. In addition, the distance over which the airplane can slide or be slowed down has an important bearing on the impact force acting on the pilot. If you could delay contact with the ground until slowed to 40 mph, for example, and were stopped in 15 feet, there would be a 4 G deceleration force acting on the pilot, or he would be thrown forward against his shoulder harness and belt with a force equal to four times his weight. If not equipped with shoulder harness, his head would be thrown against the instrument panel with over a 700-pound force, assuming an average man weighs 180 pounds. If this same plane hit at 70 mph, a 50-foot stopping distance would be needed if a force higher than 4 G were to be avoided, or impact at 100 mph would require a deceleration distance of 100 feet to keep within the same limit. If the airplane stalled, a sliding deceleration would be impossible and the impact speed would be brought to zero in a stopping distance of two feet or less, imposing close to a 30 G force!

How much of an impact force can a person withstand? Keep the above figures on stopping distance in relation to touchdown speed in mind as a 4 G impact is about the lower limit of what is considered a real crash, *i.e.*, the moral is "don't stop dead!" With a 10 G impact force, the entire structure would be crumbled. Tests have shown that if the structure does not collapse, a person can withstand 35 G's when properly strapped in.

After an area is chosen for an emergency landing, remember that three factors influencing where your touchdown spot will be are wind, plane weight, and gliding speed —with gliding speed the only variable. Make a *normal* approach and avoid the "suicide sink" technique. If necessary, lose your speed quickly by a side-slip over the boundary of the field. It is far better to side-slip than either undershoot or drop out at a high rate of sink. A precautionary or emergency landing can be accomplished safely in almost every case by a normal glide at a speed above the stall point so that you have *control* of your glide path and so that sudden gusts will not stall you out. Use full flaps and landing gear retracted in every case, on airplanes so equipped. The only exception as far as the gear is concerned is in an airplane like a B-24 with very short gear which can be landed wheels down for an emergency. Make a nose-high slip just before reaching the edge of the field, when clear of obstructions, to cut your speed before contact with the ground. Slipping, with its cross-controlling, will not be dangerous if your glide speed is sufficient. A seat belt should not be too tight and should be fastened so that it is at about a 60° angle from the horizontal for best snubbing action.

If no suitable fields exist for a quick landing in an emergency, pick an area of saplings or leafy trees. Deliberately plowing into them just above stalling speed and about two-thirds of the way up, measuring from the ground to the tree top, is the recommended procedure, taking care to aim the nose *through* the trees, not smack into a tree trunk. In this way, you will decelerate quickly in an area of uniform resistance and the airplane will be stuck in the trees firmly. If you try to pancake it on the top of the trees, chances are that you will either 1) stall it out sooner than you think and fall off down through the trees, or 2) hit on the trees and fall off anyway.

With tricycle landing gear your emergency landing procedure can be stated in one word —*brake*. Make a normal approach, touchdown as slow as possible and then go to town using the brakes.

Accomplished in the approved fashion, an emergency landing should give you little trouble. The importance of *flying in* rather than *stalling out* can be emphasized by relating the experience of a test pilot who followed the "suicide sink" school and came in for a dead-stick landing, mushing in nose-high at a very high rate of descent. The plane dropped out suddenly and his lack of forward motion raised the impact force so high as to cause him to go right down through the seat. He wore a plaster cast you know where, for six months!

Sufficient advances have been made in the design of aircraft structure in the last few years to permit making even serious emergency landings successful. This is chiefly the work of Hugh DeHaven, on Cornell's Air Safety Committee for Crash Injury Research. His research has made these advances possible.

Flight to the Caribbean

(*Continued from page 56*)

most efficient and very much like those at any United States airport.

On December 31, we left Port-au-Prince to spend New Year's Eve in Nassau, 660 miles away. We had to fly first to Camaguey to refuel. Though I had spent a considerable amount of time in the unfriendly Cuban consulate at Port-au-Prince to obtain our clearances, we were again delayed and fleeced by the Cuban authorities in Camaguey. We finally took off for Nassau and had a difficult flight because of a strong crosswind. The British welcome, however, made us forget all our troubles.

We found Nassau a perfect vacation spot. After 16 days of hard adventure, we enjoyed three days of relaxation at Nassau.

Our vacation was nearly over and we had to be back for classes in Boston on January 4. On the 3rd, we flew to Philadelphia—1400 miles away—in 12 hours of flight, refueling at Miami, Jacksonville and Richmond. The next morning we finished the trip and landed on schedule at Boston International Airport where our roommates were waiting for us.

We had a welcome drink, took our books, and went to class, leaving "Fantastic" in a hangar to cool off.

How to Plan a Flight to the Caribbean

The trip had been a complete success and our careful planning had justified itself. "Fantastic" had performed flawlessly through 60 hours of flight; we had gone everywhere we wanted to go and had seen and done more than we had hoped for. The whole adventure had cost us $750:

Gasoline (800 gallons) and Oil (10 gallons)	$350.00
Customs and Immigration	100.00
Hotels	90.00
Food	90.00
Transportation on the ground	65.00
Flight Plans	30.00
Landing fees and tie-down costs	25.00

Such a flight is not dangerous if the proper precautions are taken. The months from December through March are the best for such a trip. English is spoken everywhere, although a knowledge of French and Spanish is helpful. Hotels are usually inexpensive, and so are food and drink. While taxi service is always available, it is a good idea to rent a car. If you have more than 20 days to spend in the West Indies, we suggest that you fly to St. Croix through Cuba, Haiti, the Dominican Republic; or through Nassau, the Caicos Bank, and Puerto Rico, thus avoiding red tape. From St. Croix trips to any surrounding island can be made easily.

If you are planning a shorter trip, we recommend that you visit Santiago de Cuba, Haiti and Nassau. A side-trip to Cap Haitien would be well worthwhile, too.

Whatever you do, we suggest that you plan your trip carefully. Perhaps the following will be of some value in such planning.

Maps:

The best map for planning a Caribbean flight is the U. S. Navigational Flight Chart NF-6 ($.40). The most convenient maps for use in the plane are AAF Flight Charts

(*Continued on page 63*)

Air Transports' Next Step

(*Continued from page 55*)

four T-38's. Most of the other plans are for the coupled T-40, including the Boeing *Stratocruiser*, the C-97C *Stratofreighter*, and the big Douglas C-124 military cargo-transport. Lockheed for the present is going along with the very promising Wright *Turbo-Cyclone* compound engine for its advanced models, but later use of turboprops should not be ruled out. In the case of the T-40, an alternate powerplant will be in the running before too long—the Pratt & Whitney Aircraft Division's PT-2, in the same general power class.

Just to make it really interesting in the medium-transport field, the British are making a strong bid to sell a good number of the production *Viscount 700* (53 passengers) and the *Apollo* (40 passengers) in the world transport market. The *Viscount* prototype, which flew in the summer of 1948, is now on a tour to many European capitals, and is expected to visit the United States before the end of this year, as is a second model of the *Mamba*-DC-3.

The pure jet boys on the other hand are having a wonderful time while the highly successful operational tests of the De Havilland *Comet* and Avro *Jetliner* are going forward. To hear them tell it, the propeller is only a nuisance, and the sooner we can get rid of it the better. Sir Frank Whittle, BOAC's Technical Advisor for Jet Propulsion, has been making an extensive visit covering the important points on the main trunk routes of the Commonwealth and Empire to set up operational plans for the 14 *Comets* due for delivery from late 1951 on (the first two were bought by the British Government for experimental testing). *Comets* 17 and 18 (48-seater versions) have been ordered by the Canadian Pacific Air Lines for the Vancouver-Orient run to Tokyo and Hong Kong. Thus by late 1953, *Comets* may be encircling the globe.

The Avro Canada people are also pushing developments of their 460-mph medium-range *Jetliner*. The first prototype is scheduled to fly the North Atlantic in August to take part in the 1950 Farnborough Show, and then fly to Australia for extensive operation as a freight carrier. A second prototype is expected to be ready by late summer, and a sales campaign directed toward Europe and the United States is well under way. The production models probably will be powered by two Canada-developed *Orenda* turbojets of 8,000 lbs thrust, instead of the four *Derwents* (3600 lbs thrust) of the two prototypes.

The acid test as to whether improved propellers will get a new lease on life with turboprop units or whether we are ready to switch to turbojets within a few years will be fuel economy (with its vital effect on range and payload) and flexibility. Some recent studies, for example, show that a modified DC-6 with four P & W PT-6 turboprops of 5500 hp would cruise as fast as the *Comet*, with a range 40 to 50 per cent greater.

Summing it up, it appears that the next step in commercial air operations will be the turboprop. But for runs of 1,000 miles or more, the straight jet is the ideal, and may be expected to dominate the picture by 1960 or earlier.

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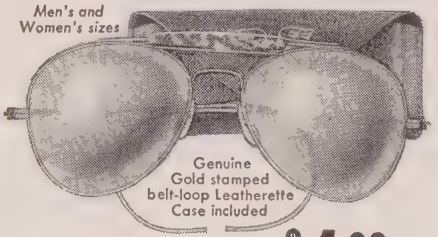

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(Continued on page 62)

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(*Continued from page 61*)

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Flight to the Caribbean

(*Continued from page 59*)

FC-44, 45, 46, 48, 49, 248 and 249 ($.25 each), and World Aeronautical Charts WAC-525 and 586 ($.25 each). We found the Pilot Handbook to the Caribbean unnecessary. It costs $6. These maps may be purchased from the U. S. Coast and Geodetic Survey, Washington, D. C.

Necessary Papers and Procedure:

Watch out for red tape! American citizens should have passports and International Health Certificates showing evidence of smallpox vaccination. No visas are required in the islands we visited.

It is advisable to write to the Miami Customs Office giving them the estimated date of departure and a request for an affidavit blank for the plane and a pad of Form 7507, which is necessary for entrance and exit in American and British possessions, and St. Martin. Time is saved by typing these forms before departure. All those making the flight are considered members of the crew and should be specified as such on this form, a step simplifying procedure at customs and saving extra fees at some airports.

The authorization to enter Cuba may be obtained by writing to the Cuban consulate in Miami. This office will send forms which you must take to that consulate before leaving for Cuba. This clearance costs $10. The same procedure must be endured when re-entering Cuba, whether from Haiti, Nassau or the Dominican Republic. Another form, the "Declaration de Entrada y Salida Para Aeronaves en Cuba" is used at all Cuban airports. It is advisable to get about 25 of them from Pan-American Airways in Havana. It is also necessary to write to the Ministerio de Communicaciones, Havana, for authorization to fly in Cuba, naming the airports at which you wish to stop, and giving the approximate dates of arrival and departure. When in Havana, the "captain" of your plane must go to the Ministerio to get this form. On leaving Cuba, you will need a few "Entrada y Salida" forms.

Permission to fly in Haiti may be obtained from the Haitian Consul-General in New York or the Haitian Embassy in Washington, D. C. In the request, you must give the number and type of plane, the date of flight, naming the airports which you expect to use in Haiti. Either Form 7507 or "Entrada y Salida" is requested on landing in Haiti. Customs fees amount to $15. No forms are necessary for leaving Haiti. All further flights in Haiti must be authorized by the Haitian Air Force officer-in-charge at Bowman Field, Port-au-Prince.

Permission to land in Ciudad Trujillo is obtained by writing the Consul-General of the Dominican Republic in New York who will forward your request to the Ministerio de Guerra, Ciudad Trujillo. This costs $4. Form 7507 is used here. The customs fees are about $35.

There is no need to write for permission to land in any of the U. S. or British islands in the West Indies, but it is advisable to write the Airport Manager in each place stating the date of arrival. Cables must be sent 24 hours in advance of arrival.

Authorization for landing in Martinique or Guadeloupe may be had from the Prefet de Fort-de-France, Martinique, and the Prefet de Pointe-a-Pitre, Guadeloupe. All forms used here are provided by Customs, and there are no fees.

A letter must be written to the manager of the airfield at least one week before arrival in St. Martin. The customs fee is one guilder.

Flight Plans:

During the entire trip, flight plans must be made, either through CAA, which charges nothing, or through Pan-American, which charges about $2.

Gasoline:

Eighty-Octane non-leaded gasoline is scarce; 91-Octane is available except in Antigua and St. Kitts which have only 100-Octane. No gasoline is available in St. Martin. Credit cards are hard to get and not worth the effort. Special arrangements can be made with Shell in Port-of-Spain, Trinidad, to have gasoline sent to different airports in the Caribbean. If this is necessary, write as early as possible because this gasoline is sent in by schooner.

Equipment:

Mae West jackets and a life raft are essential. A two-man life raft seems adequate for three. Flares and a mirror are effective signal devices. An emergency fishing kit is light, inexpensive and can be worn under the Mae West. Special tool kits, safety wire and safety pins are recommended. A good first-aid kit should be taken. We found sleeping bags and binoculars unnecessary. Nylon shirts are convenient.

Money:

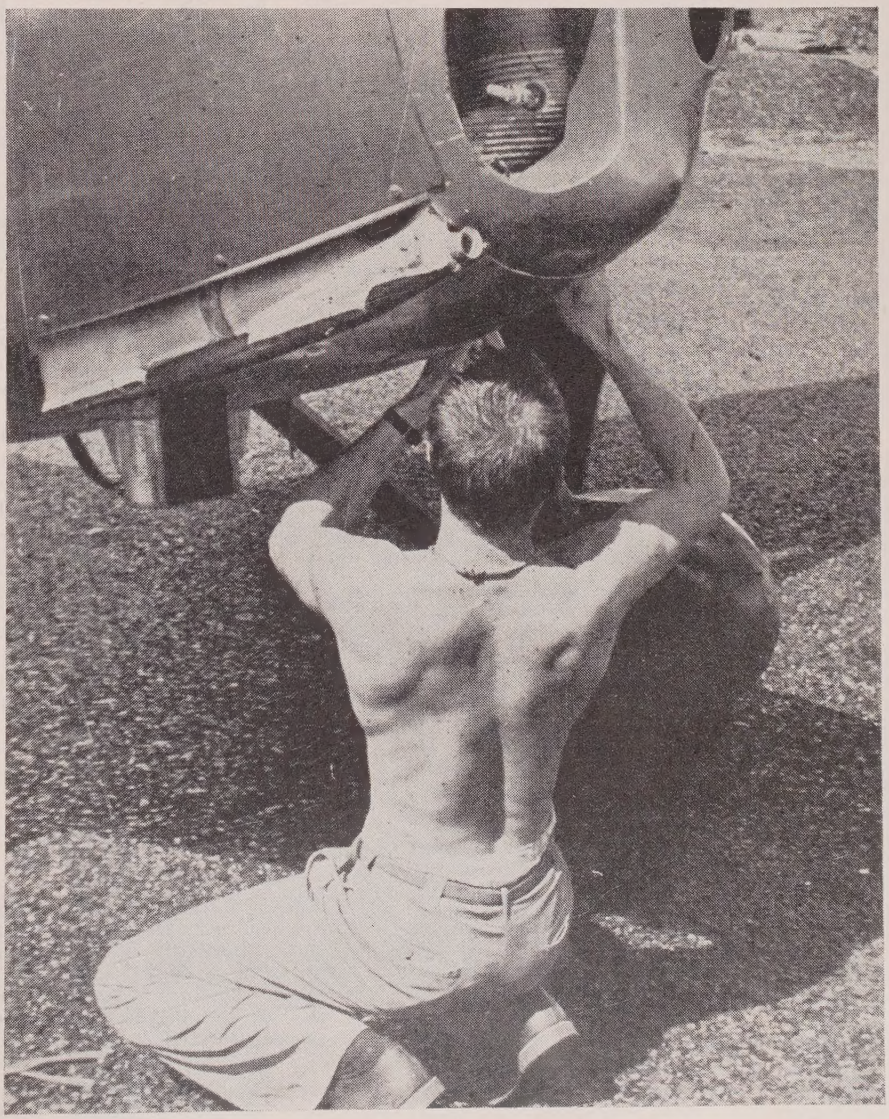
It is advisable to take some U. S. currency which is acceptable in all West Indian islands, but most of your money should be in Travelers Checks.

General Information

The Pan-American Union, Washington, D. C. provides booklets and pamphlets about the West Indies on request. The Haitian Travel Bureau, 791 Lexington Avenue, New York 21, sends a Travel Guide for $.50. The Dominican Republic Information Center, 6 West 51st St., New York 20, supplies all the information needed for travel in that country. For the British West Indies, Aspinall's *Guide to the West Indies* is excellent. Back issues of the *National Geographic* may prove of interest, too.

This is all the information you'll need to make your Caribbean flight a success. We're three who recommend this aerial junket . . . and we know you'll have fun.

PILOT HENRION gives the engine a check before taking off on the trip back to the U.S.



Dilbert

(*Continued from page 37*)

bank. When it goes forward against the instrument panel, you're in a dive. Back in your lap, you're climbing. When it hangs straight up, you're on your back."

He held the spell a moment. Then he said, "Simple, ain't it? And the beauty of it is it will never get out of order. It is based on the law of gravity, and is just as dependable."

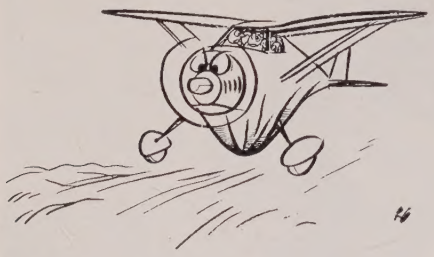
No one spoke. Dilbert went on, "It's a good thing I had that trouble last week. Now there'll never be another crash at night. or in bad weather. Anybody can fly blind with this thing; all you have to do is apply the principle of the plumb bob."

As Dilbert stalked proudly toward his plane to install his invention, one pilot recovered sufficiently to whisper in awe, "Cripes, the guy is plumb cuckoo!"

Don't Lose Your Balance—Dilbert had a sweet little five-place job which he swore by. It handled beautifully; according to him, it could do everything but cook. In other words, he had a lot of faith in his airplane.

So much faith, in fact, that he took aboard two extra passengers and their luggage one day on a return flight from a fishing trip.

What happened was he ran into heavy smoke from a brush fire and had to go on instruments. About this time, one of the passengers nervously moved to the rear of the cabin. This threw the plane out of control. I forgot to mention, the plane was loggy from the take-off. Fortunately, Dilbert had her almost in level flight again when she hit. Fortunate for the passengers, that is, no one was seriously injured. But the sweet little plane was a shambles.



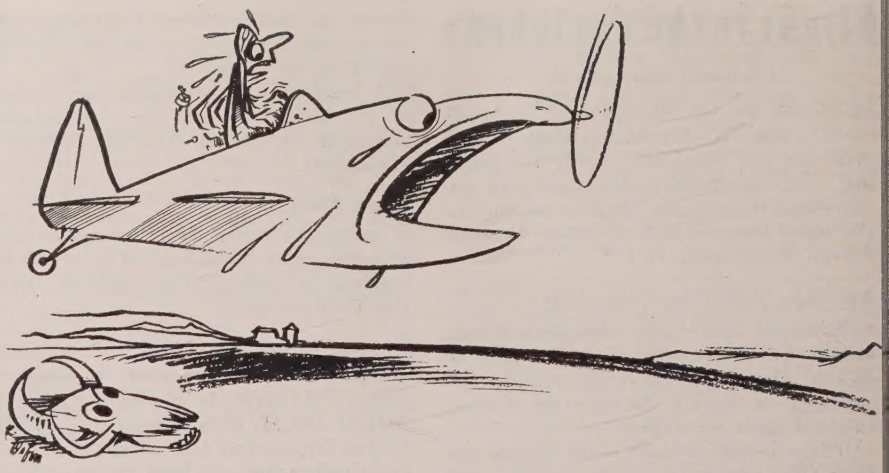
Of course, Dilbert screamed to the dealer when he got home, that he had been robbed. He proved it by pounding on a certain page in the Pilot's Handbook which showed in black and white that he wasn't over the weight limit.

The dealer admitted this point, then he quietly turned the page and pointed to a pertinent little paragraph, also in black and white, about weight distribution. According to Dilbert's own insistence on how the plane was loaded, this showed that it was way out of balance.

Never think of weight alone. Whenever you think of your load—and you always should—always think of *weight and balance.*

There's another moral here, which Dilbert probably missed: An ounce of judgment is worth a ton of misplaced confidence.

What Emergency—If you really know your stuff, instrument flying is just as easy as the fair weather kind. Here's the proof.



When instrument weather suddenly descended on a busy airport, arriving traffic was really stacked up. The last to arrive, a military pilot in an advanced trainer, was told he would be number 13 to let down. He was given appropriate holding instructions.

All went well for a time, until the tower failed to raise #13 by radio. All traffic was suspended while frantic efforts were made to locate the missing plane.

Thirty minutes later the missing pilot nonchalantly reported back in position at the top of the stack, where he was supposed to be. The tower immediately wanted to know what was wrong! Where had he been?

"Nothing wrong," replied the self-reliant pilot. "I didn't have enough gas to hold for my turn to let down, so I went into Mumble Field (nine miles away) and gassed up, so I could wait. I'm back in position again. Is it my turn to let-down now?"

Know Your Fuel System—Case histories show that carelessness in handling fuel supply causes a large number of unnecessary accidents. Some pilots run into trouble when they attempt to take off or land on tanks restricted to cruising conditions. Others run one tank dry and either fail to shift to a full tank or shift back and forth from one tank to another without allowing sufficient time on any one tank to regain suction. Still others shift to "OFF," fail to center the selector valve, do not use the auxiliary fuel pump to give positive fuel head, or run a fuel tank dry at too low an altitude.

Fuel trouble presents an emergency which usually requires immediate corrective action. Corrective action, or better yet preventive action, is something you can't apply unless you know your stuff. Basic requirements:

1. Know your fuel system and how to operate it.
2. Always keep a check on your fuel.
3. Always save your best tank till last, and shift to it for low-altitude flying, including take-offs and landings.
4. As your tank gets low, watch your fuel gages closely, and shift at the first indication of fuel-pressure fluctuation.
5. Never run a tank dry at low altitude, and be sure you know how to regain fuel suction. Here's how:

a. Shift to proper tank with positive, visual check of selector valve position.

b. Switch on auxiliary fuel pump, or use hand pump.

c. Retard throttle to starting position. Place mixture control at "idle cut-off" until adequate pressure is built up. (To prevent premature starts and minimize backfires)

d. Nose down to maintain speed.

e. Use primer if necessary.

1. To the right.

2. Wash exposed skin areas thoroughly with soap and water.

3. No. To avoid engine fouling, have idling mixture set correctly, and make periodic engine run-up.

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